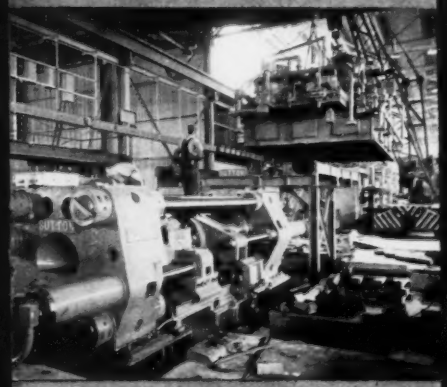
Copters Chop Costs 66



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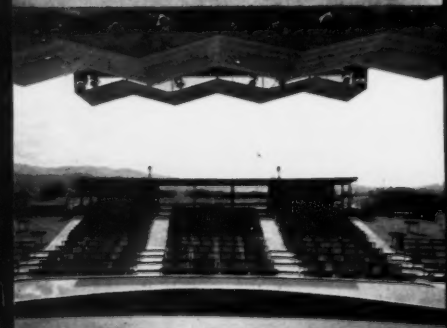


Outdoor Opera 84

Celebrate Electric Week 96

ELECTRICAL WEST

March 1958
50 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Western atomic team — Norman Sutherland, PG and E president, Perry Yates, Bechtel Corp., Arthur Bragg, G-E — announce break-through to competitive atomic power now in PG and E's . . .

New 60,000-kw Atom Plant . . . 63

Wholesalers' Profit Plan 62

'57 Sales Record 75

Raceway for 480/277-V 81

3 wonderful things happen when you cook electrically

...because there's no flame

1. Your kitchen stays cooler because flameless electric cooking puts the heat directly into the food, not into the room. Result: your kitchen—and family rooms adjoining kitchens—are as much as 16° cooler even in summer.

2. Your kitchen stays cleaner far longer. Flameless electric cooking produces none of the by-products of flame, no soot or smudge to darken kitchen walls and curtains. Your pans keep their new look, too.

3. Your meats taste better because they cook juicier. In the electric oven there's no flame-feeding draft of hot air to dry out your roasts. They cook in moist heat that seals their good juices in. And, as you know, juice is the secret of flavor in meat.

SOUTHERN CALIFORNIA Edison COMPANY *helps you* LIVE BETTER—ELECTRICALLY

MEDALLION HOME LIVE BETTER ELECTRICALLY

Be sure your new home is up-to-date electrically.
Look for the Electrical Industry's famed "Medallion" Award before you buy any home.

Edison is selling the advantages of electric cooking— to boost your electric range sales

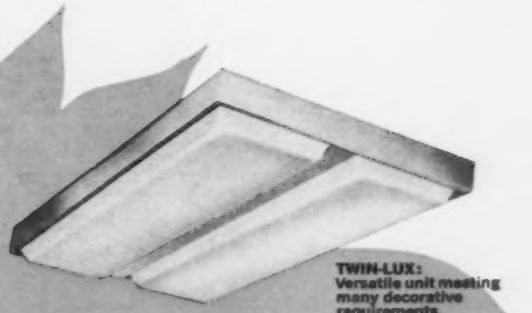
SMOOT-HOLMAN

your

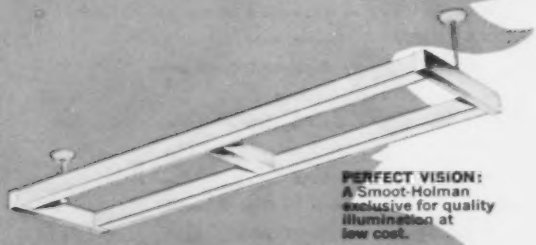
best source

for

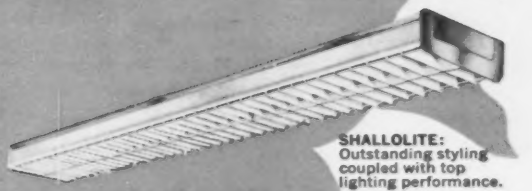
"tomorrow's lighting today"



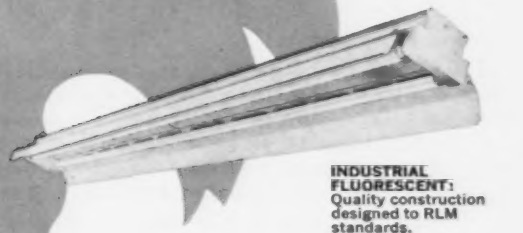
TWIN-LUX: Versatile unit meeting many decorative requirements.



PERFECT VISION: A Smoot-Holman exclusive for quality illumination at low cost.

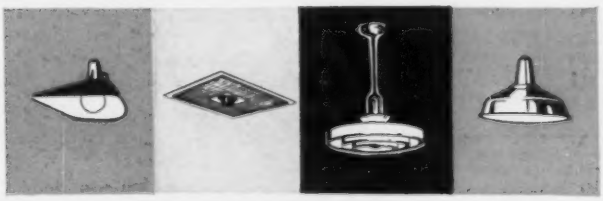


SHALLOLITE: Outstanding styling coupled with top lighting performance.



INDUSTRIAL FLUORESCENT: Quality construction designed to RLM standards.

A complete selection of commercial fluorescent, industrial fluorescent, commercial incandescent, industrial incandescent and outdoor flood lighting equipment.



PROPER LAYOUT MADE EASIER! Send for your FREE Smoot-Holman "Lighting Guide" ...and auto-calculator to compute the required lamps and fixtures for most commercial and industrial interiors.

Certified Lighting

SMOOT-HOLMAN COMPANY • *Inglewood, California*

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S. Established 1887

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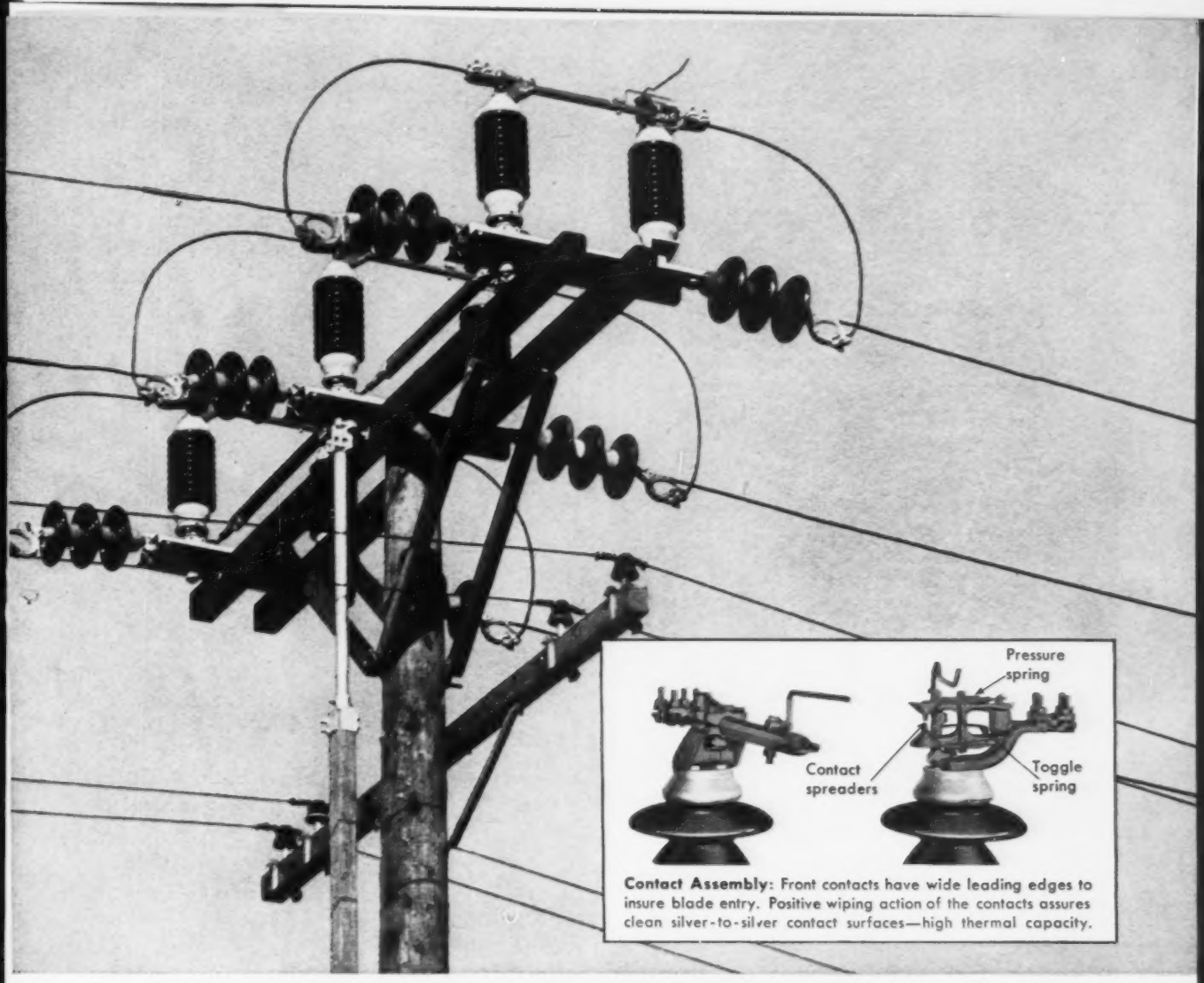


Contact Assembly: Front contacts have wide leading edges to insure blade entry. Positive wiping action of the contacts assures clean silver-to-silver contact surfaces—high thermal capacity.

L-M's New Side-Break Switch Is Rugged, Reliable and Easy To Operate

Line Material has designed a new, rugged side-break switch which has all the desirable operating features of a dependable switch for both line and substation sectionalizing.

Only six current transfer points with high-pressure silver-to-silver contacts and heavy back-up mass provide high thermal capacity for continuous or short-time fault currents. Straight-line current path minimizes short circuit forces tending to open switch. Minimum frictional drag at rotating terminal is achieved by current transfer on center of rotation. Rugged full-floating contacts swivel to give smooth, easy operation, positive wiping motion, and definite ice-breaking action.

Positive Toggle Action

Wide-angle leading edges on front contacts insure blade entry regardless of alignment, with no loss of contact pressure. Contact-positioning spring has positive toggle action to hold the contacts in the open position (45° from switch centerline) or firmly in the closed position. Ease of operation and long contact life result, because contact spreaders preload pressure springs for minimum contact movement during blade entry. Wide-spaced contact jaws and clearance around moving parts facilitate positive switch action under severe ice or corrosion conditions.

Silicone-Lubricated for Life

All bearings and moving joints on the switch are silicone-greased—lubricated for life, and positively sealed with silicone cord rings. Water, dust or dirt cannot enter to affect bearing operation.

Get Complete Information

L-M's new side-break switch is available in 600 amperes, 7.5 to 69 kv as a single-pole, or up to a six-pole unit. Ask your L-M Field Engineer for information and bulletins on L-M's Power Switching Equipment. Or write Line Material Industries, Milwaukee 1, Wisconsin.

McGRAW EDISON

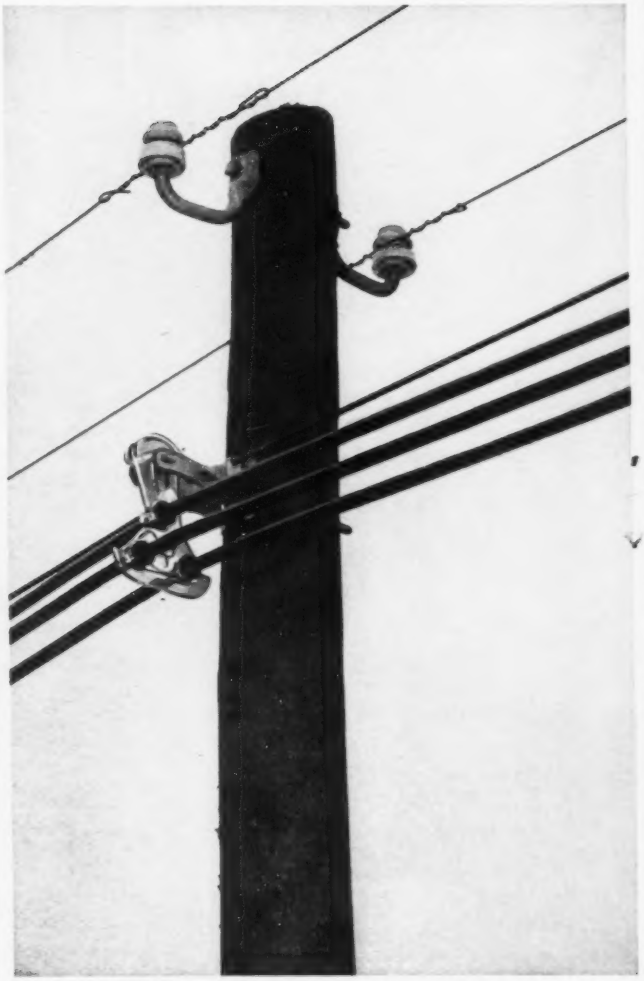
LINE MATERIAL Industries

McGRAW-EDISON COMPANY

Power Switching Equipment

302

Conventional aerial system required cross-arms...tree-pruning is major cost and irritation factor with utilities companies.



New Roebling Aerial Spaced System with ROECLAMP requires only *one foot* of clearance through trees! Note improved, compact appearance. No cross-arms are needed.

Key to the system is Roeclamp ...unit construction means no separate parts...installs without tools...Linemen go for it!

Here lineman has grommets mounted on conductors and messenger and is about to mount ROECLAMP over messenger . . . ease of installation means one crew can install more line footage per day . . .

New Roeclamp* Cable System Costs 60% Less than Self-Supporting Cables, Minimizes Tree Problems, Installs with Ease, Looks Better!

Roebling Self-Supporting Aerial Spaced Cable is the perfect answer in areas where trees are a problem, where appearance is an important factor, or in areas where the most compact, economical and easily serviced system is desired. That means *just about everywhere!*

The Roebling System, with the remarkable new ROECLAMP, is designed for 5kv use (2400/4160Y and 4800 v delta systems) and 8kv use (4800/8320Y and 7200 v delta systems). Phase identification is positive at a glance, since cables are maintained in the same relative position along their entire length. Phases may be added or removed, and the system may be reinforced *without removing* ROECLAMPS from messenger! *Conductors may be replaced without tools* (except for splices and taps).

Low impedance results in better voltage regulation — and the heat-dissipating properties of the Roebling system mean higher current-carrying capacity. Lightning protection and protection from falling tree limbs are provided by the strong copperweld messenger, which runs the length of the system. Aluminum conductors come in 17 standard sizes and strand constructions to cover a broad range of applications. They are specially made with a greater number of finer strands to give extra flexibility. Standard insulation is extruded Roeplastic® P-117, although other types of extruded insulations are available, depending upon proposed usage.

The Roebling Aerial Spaced System featuring the ROECLAMP costs less, installs fast, gives optimum service and requires minimum maintenance. You can't afford not to investigate it! Your Roebling representative can give you a demonstration of the revolutionary new ROECLAMP—and will give you more facts about this remarkable system. Call him — or write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

* Patent pending

One motion and ROECLAMP is on messenger and ready to receive conductors. Phase changes and repairs do not necessitate removal of clamp. ROECLAMP comes complete with grommets to fit messenger and conductors you order . . .

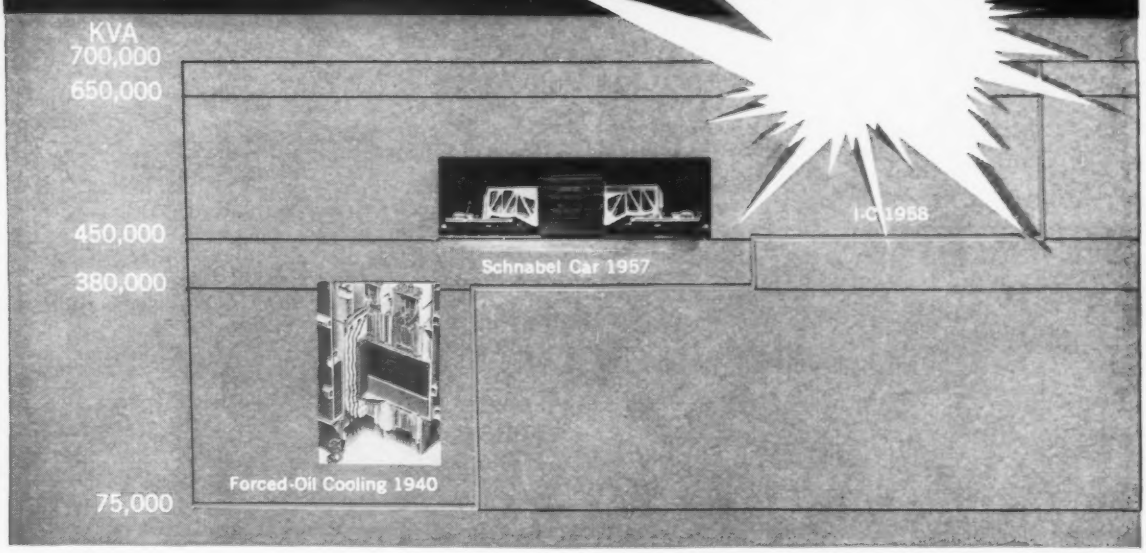
Note how easily conductors drop into place. Installation is measured in seconds, even with "boxing" gloves on. ROECLAMP is Plexiglas†, tests to over 1000-lb. breaking strength, offers outstanding weather resistance, best possible electrical properties . . .

36 ROECLAMPS are required every 1000 ft. Installation is completed by hand-tightening of nut. Not even a screw driver is required!

† Reg. T.M.—Rohm & Haas Co.

Plowback of Earnings into research
for new designs and materials
helps Westinghouse develop

THE THIRD* MAJOR BREAKTHROUGH
IN POWER
TRANSFORMER
DEVELOPMENT



J-70867

*ALL THREE FROM WESTINGHOUSE!

Watch for the THIRD MAJOR BREAKTHROUGH announcement . . . in next issue

YOU CAN BE SURE...IF IT'S Westinghouse

Highlights of Proposed Western Construction

► Proposed highlights of Western construction:

Five-story hotel for El Segundo, Calif., $2,000,000.

Slum clearance for Redevelopment Agency of Sacramento, Calif. Work will start in August for apartments and offices if architectural plans are approved. Cost: $15,000,000.

Shopping center on 44-acre site for San Jose, Calif., $10,000,000.

Hall of Justice for city of San Francisco, $16,300,000.

Nine-story office building and three-story garage with restaurant for Redwood City, Calif., $3,500,000.

Fifteen-story federal office building at San Francisco, $45,300,000.

Four-story chocolate plant at Salinas, Calif., $5,000,000.

Nellis Air Force Base 200-unit housing, Las Vegas, Nev., $3,500,000.

Uranium mill at Lakeview, Ore., $2,500,000.

Naval base development at Lemoore, Calif., $8,000,000.

Tract for 13 industrial companies at South San Francisco, Calif., $3,000,000.

Shopping center, 33 acres, for Fresno, Calif., $10,000,000.

Family housing, 375 units, at American Lake, Fort Lewis, Wash., $6,000,000.

Baseball stadium at Tacoma, Wash., $1,000,000.

Biscuit factory in Denver, Colo., $8,000,000.

Reactors and improvements for Atomic Energy Commission, Richland, Wash., $25,000,000.

Additions to University of Santa Clara, Santa Clara, Calif., $2,950,000.

New schools and additions to existing schools for Pueblo, Colo., $4,500,000. . . Hotel for Pueblo, $1,500,000.

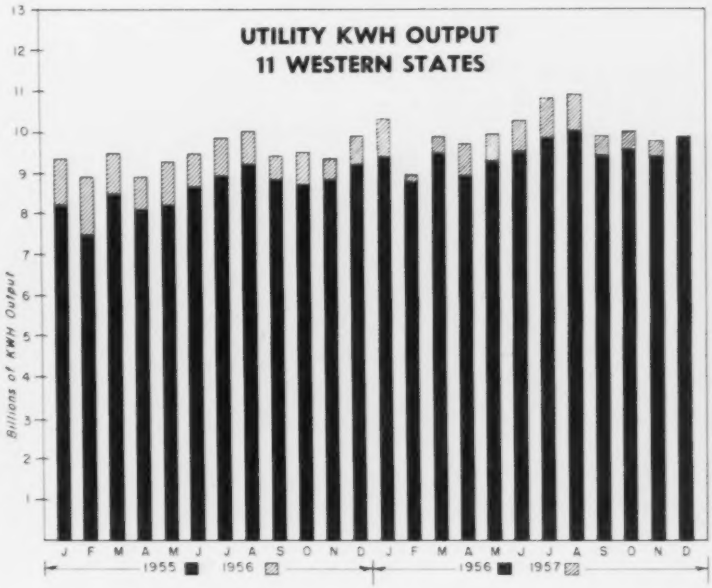
Grade and junior high schools for Westminster, Colo., $2,000,000.

GSA received a low bid of $4,017,000 for constructing a federal office building at Albuquerque, N. M.

A hangar, office and shop are to be built at International Airport, Los Angeles, for TWA. Estimated cost: $5,000,000.

The government is spending $41,000,000 to convert five existing Air Force bases in Washington, Idaho and Montana for use by Strategic Air Command under SAC dispersal program.

----How're We Doing?


UTILITY KWH OUTPUT
11 WESTERN STATES
Billions of KWH Output
1 2 3 4 5 6 7 8 9 10 11 12 13
J F M A M J J A S O N D J F M A M J J A S O N D
1955
1956
1956
1957

Output Comparisons

Year-to-year Kwh Output Changes in Western Regions and U. S.
Per Cent Changes Over Same Week One Year Ago

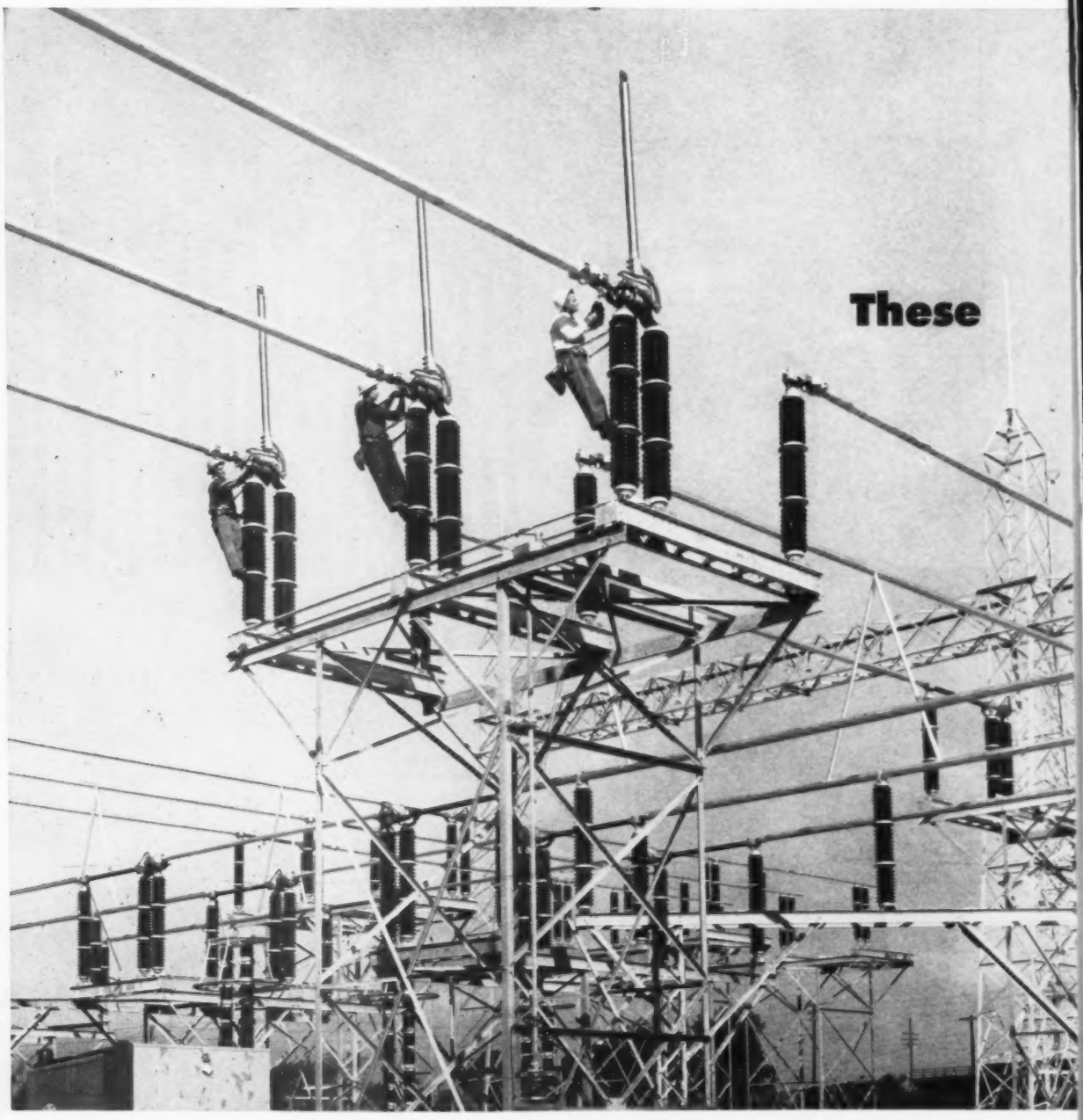
Week Ending	Rocky Mountain	Pacific Southwest	Pacific Northwest	U. S. Total
Jan. 4	+3.8	+0.9	−1.8	+0.2
Jan. 11	+5.0	+2.1	−1.5	+1.5
Jan. 18	+2.7	+4.9	−5.9	−1.2
Jan. 25	+2.7	+2.4	−7.6	−0.1

Missile Happy

There's a discernible trend toward the West becoming the missile center of the free world. The huge missile base near Cheyenne has already been announced in these columns. Now the Navy and Lockheed missiles system are starting a huge building program of erecting test stands for IRBMS deep in the heart of the Santa Cruz Mountains south of San Francisco. Farther south near Santa Barbara, the Defense Department is developing a huge missile-launching site —said to be the only place in the world where missiles can be fired due south (for surveillance of satellites that orbit over both poles as the world turns below) without hazards from spent stages of the rocket motors. Installations like these, plus the heavy concentration of electronic industries in the Pacific Southwest hint that missiles may well become the West's newest (and possibly largest) industry.

Power Pace Slows

Power use nationally and in the West increased in January but at a much decreased rate. Last year for the week of Jan. 26, increases for the Rocky Mountain, Pacific Southwest and Pacific Northwest were +12.8%, +16.8% and +9%, respectively, as compared to the figures above.



Part of 230 kv bus at Niagara Mohawk Power Corporation's Gardenville substation, planned for 600,000 kva ultimate capacity. Energized October, 1957. Insulators are Lapp High Strength Station Posts, No. 51688, 900 BIL.

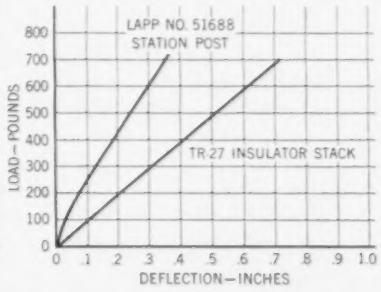
WESTERN REPRESENTATIVES:

Los Angeles: Earl S. Condon Co.
San Francisco: C. E. Ingalls & Sons
Seattle: Charles F. James
Butte: R. E. McDonough Co.
Salt Lake City: Riter Engineering Co.

230 kv switches will stay lined up

they're on Lapp Station Posts

Even if there weren't a dozen other good reasons, Lapp Station Posts could merit specification for high-voltage switch use on their superiority in *stiffness* alone. Fact is that, at all cantilever loadings, deflection of 230 kv Lapp Station Post is approximately 50% that of corresponding conventional pin-cap stacks (as indicated by deflection curve at right from laboratory deflection measurements). This is easily understood when you consider the differences in these designs . . . the Lapp Station Post unit is a one-piece porcelain post with caps cemented at the ends in large-area, low-intensity compression grip . . . compared to the nested porcelain shells, internal pins, and high intensity tension-loading of stacking units. No wonder switches on Lapp Station Posts line up better under all loads . . . and operate better in all kinds of weather . . . throughout their life!



They go up easier, faster, too . . . assembled and installed with 16 bolts, as compared with 24 bolts required by a conventional 230 kv switch insulator. Weigh 30% less, too. Lapp Station Posts for 230 kv are available in two BIL ratings (900 kv withstand and 1050 kv withstand) and in three strength ratings . . . including new extra-high-strength that possesses cantilever values greater than those of any switch and bus insulators ever offered before at this voltage.

Look into the merits of Lapp Station Posts for your new construction at 230 kv (also at every other voltage from 7.5 kv to 385 kv . . . or higher). It will pay off in improved operating records, lower maintenance cost and longer life of your equipment.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

EW news roundup

The Edison Gold Medal for 1957 has been awarded to John K. Hodnette, executive vice-president of the Westinghouse Electric Corp. In the photograph above, Mr. Hodnette is receiving the medal at a presentation ceremony presided over by J. H. Foote (right), president and chief engineer of Commonwealth Associates and senior vice-president of AIEE. The presentation was made at the opening session of the AIEE winter convention in New York

—EW—

FUNCTIONS—Two paragraphs from the statement by Victor McMullan, chairman of the Washington State Power Advisory Committee, will be of interest to Westerners who have been wondering about the purpose of this group.

"It is not the policy of Governor Rossellini's administration to put the state into the power business. Neither is it our policy to compete in any way with the utilities, industries or agencies concerned with the generation or distribution of electrical energy. This follows the mandate of the last legislature which abolished the statutory authority of the previous State Power Commission.

"Our committee's purpose and aim is to assist the state's public utilities, both private and public, in the difficult job of keeping up with the ever-increasing demand for electrical energy."

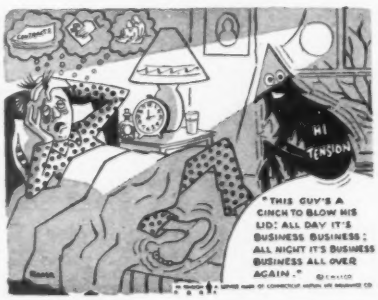
BINGO—EEI reports that 16,250,000 kw of new capacity are scheduled to begin operation in 1958. This tops 1957's figure of 8,399,000 kw by 93%. Construction of generating facilities in the U. S. through 1961 as now scheduled will add 52,928,000 kw to the nation's total capacity as of the end of 1956. Forecast for 1960: a generating capability of over 171,000,000 kw.

—EW—

Does your community have transportation problems? If so, you may want to borrow the film "Millions on the Move" now available from your local General Electric Apparatus sales office. It can be borrowed for showing to your civic groups.

—EW—

Get Off the Worry-Go-Round



Moonlight Madness

Recognize yourself? If you do, it's time to reorganize yourself.

Don't let unsolved problems of the day pursue you all night. As problems arise during the day, solve them. Make your decisions, then forget about them. Don't keep wrestling with problems that really aren't yours to solve. Most problems can be divided into two groups: those you can do something about and those over which you have no control.

And if you find yourself lying awake, don't fret about lack of sleep. Most of us don't need half as much sleep as we think. But we do need rest. So if you can't sleep, take it easy. You'll feel much better in the morning.

Macy's is advertising twin-size mink blankets for sale at $4,000 each, plus the usual federal, state and local taxes. Anybody having any trouble selling electric blankets at the current unusually low prices?

—EW—

NUCLEAR PROJECT—Atomics International, the nuclear energy research company that worked with Southern California Edison Co. on the sodium reactor experiment, has reached an agreement with the Southwest Atomic Energy Associates for a $5,354,000, four-year research and development program to determine the economic feasibility of the advanced epithermal thorium reactor concept.

The group is considering construction of one or more full-scale atomic power plants utilizing the AETR as a source of energy.

Southwest Atomic Energy Associates is made up of 15 investor-owned electric companies in Arkansas, Kansas, Louisiana, Mississippi, Missouri, Oklahoma and Texas.

—EW—

In three more years, 'tis reported, the last 10,496 gas lights will be replaced, in Philadelphia, by new-fangled electric lights.

—EW—

NEW IDEA—European cities have in common the street pillar on which advertising signs are posted and which in many cases serve as a connection box for circuits to nearby buildings. Now the South of Scotland Electricity Board is experimenting with a new combination that may help them find the solution to suitable substation sites in heavily built-up areas.

Near Glasgow a 500-kva, 11-kv silicone-insulated transformer has been sunk in the ground and is surmounted by the familiar street pillar. Cooling air enters the lower

Time-saving convenience. No waiting for short lengths to be cut off reels. Buy only what you need to finish up the job.

Quick, easy handling. You don't need a truck to pick up the wire you need. Just throw one of these cartons in the front seat of your car.

All-round protection. No matter where you use short lengths on the job, these convenient Rome cartons will protect your wire up to the minute it is strung.

Need short lengths of bare or weatherproof wire to finish up a job?

Pick them up in these handy Rome cartons

For your convenience, Rome bare and weatherproof wire, Triplex and Duplex SS cable—in short lengths—are packaged in handy cartons.

Don't lug a full reel onto the job when all you need is a short length to finish up the installation. Just ask your Rome distributor for the size you need in one of Rome's easy-to-handle cartons. 140

Type	Size	No. of Strands	Conductor	Covering	Length	Package	Packaging	Approx. Wgt. Lbs
Bare	14	Solid	Copper	None	1000′	Spool	1 per carton	13
Bare	12	Solid	Copper	None	1000′	Spool	1 per carton	20
Bare	10	Solid	Copper	None	500′	Spool	1 per carton	16
Bare	8	Solid	Copper	None	500′	Spool	4 per carton	105
Bare	8	7	Copper	None	500′	Spool	4 per carton	105
Bare	6	Solid	Copper	None	300′	Spool	4 per carton	105
Bare	6	7	Copper	None	300′	Spool	4 per carton	105
Bare	4	Solid	Copper	None	200′	Spool	4 per carton	105
Bare	4	7	Copper	None	200′	Spool	4 per carton	105
Bare	2	7	Copper	None	250′	Coil	1 per carton	51
Weatherproof	14	Solid	Copper	Roprene	500′	Coil	1 per carton	10
Weatherproof	12	Solid	Copper	Roprene	500′	Coil	1 per carton	14
Weatherproof	10	Solid	Copper	Roprene	500′	Coil	1 per carton	20
Weatherproof	8	Solid	Copper	Roprene	500′	Coil	1 per carton	34
Weatherproof	6	Solid	Copper	Roprene	500′	Coil	1 per carton	51
Weatherproof	14	Solid	Copper	TK	500′	Coil	1 per carton	13
Weatherproof	12	Solid	Copper	TK	500′	Coil	1 per carton	17
Weatherproof	10	Solid	Copper	TK	500′	Coil	1 per carton	27
Weatherproof	8	Solid	Copper	TK	500′	Coil	1 per carton	36
Weatherproof	6	Solid	Copper	TK	500′	Coil	1 per carton	54
Triplex SS	6	Solid	Aluminum and ACSR	Roprene or Rolene	500′	Coil	1 per carton	80
Triplex SS	6	7	"	"	500′	Coil	1 per carton	80
Triplex SS	4	Solid	"	"	500′	Coil	1 per carton	110
Triplex SS	4	7	"	"	500′	Coil	1 per carton	110
Duplex SS	6	7	"	"	500′	Coil	1 per carton	50
Duplex SS	4	7	"	"	500′	Coil	1 per carton	75

• Save this ad and use it as a handy buying guide for Rome wire and cable in short lengths.

ROME CABLE
CORPORATION

These supplementary pages, just off the press, contain blueprints and complete specifications on revisions and additions to our line of Drop-Forged Steel and Aluminum Hi-Line Hardware.

Bring your BTC Hi-Line Hardware Catalog up to date . . . send for these FREE supplements today. If you do not have a catalog, indicate this on coupon and a complete, revised copy will be mailed to you without charge.

Pioneers in Drop-Forged Hi-Line Hardware

CLIP AND MAIL THIS COUPON

THE BREWER-TITCHENER CORPORATION
HI-LINE HARDWARE DIVISION
CORTLAND, NEW YORK

☐ Please send supplementary Pages for BTC Catalog.
☐ Send complete, revised BTC Hi-Line Hardware Catalog.

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____

louvers of the pillar and is directed to the bottom of the transformer tank and the hot air is brought up the center section of the pillar and emitted at the top. The air-cooled, silicone-insulated construction saves space and is expected to eliminate or minimize difficulties due to dampness.

—EW—

Hickernell

AIEE HEAD—L. F. Hickernell, chief engineer of the Anaconda Wire & Cable Co., has been elected president of the AIEE at the winter meeting held in New York the first week in February. He will succeed Walter J. Barrett, whose term as president of the institute expires July 31, 1958

—EW—

California's Congressman J. J. Allen recently came up with an observation that is worth repeating: "It's surprising how little attention businessmen pay to political affairs these days. I should think that politics should, in fact, be a major concern for them. After all, for better or worse, they should try to find out how well we're handling that 52% of their profits."

—EW—

AIRBORNE – General Electric Co. has secured the contract to supply electrical power generating systems for Convair 880 jet airliners.

Total value of the contract is some $2,918,000. This is for the first 40 of the Convair 880s. The first flight of the plane is scheduled for January 1959.

—EW—

OLD-TIMER – Metermen of the Franklin County PUD finally managed to get their hands on a meter that had been in service for 23 years since its last testing on Aug. 14, 1934.

The meter tested out showing 4/10

Take This Management Test

Do Your Attitudes Stimulate Communications Upward?

Experienced management men find that certain attitudes are necessary if an administrator is to facilitate communication by subordinates. Test yourself against the expression of these attitudes. See page 61 for answers.

	True	False
1. Employees are paid to keep management informed. Failure to do so represents questionable performance on their part.	.....	.....
2. If a manager develops too much feeling for the subordinate's viewpoint, his decisions become biased.	.....	.....
3. After a decision has been reached, it is necessary to get "feed-back" as to how subordinates react to the decision.	.....	.....
4. A management man learns the most when the subordinate is not aware that he is being interviewed.	.....	.....
5. In order to do a good job of supervision, you have no need for special information-getting techniques.	.....	.....
6. Some subordinates not only change a story around to fit their own interpretation but actually come to believe the warped story they are telling.	.....	.....
7. The only way to secure information from a subordinate is to get him to feel that you and he are talking on an equal basis. After all, you are both employees of the same company.	.....	.....
8. Usually the only way for the boss to get any reliable information from an employee is to try to talk to him after hours or outside of the office.	.....	.....
9. Thinking about what you should have said after an interview is usually a waste of time.	.....	.....

of 1% high at light load, and 6/10 of 1% low at full load, deviations that virtually cancel each other out.

Harry Hudlow explains the 23-year period without testing by pointing out that the meter was locked up on a back porch and not available at previous check periods.

The meter was a Westinghouse CS.

—EW—

CONTRACT—A Denver firm, Engineering Consultants Inc., has received the contract to prepare designs and specifications for the Yanhee hydroelectric project for the government of Thailand.

Engineering Consultants Inc. was formed by C. L. Killgore and E. R. Dexter, former Bureau of Reclamation engineers. Killgore is president and Dexter is vice-president.

Total cost of the project is reported to be $100,000,000, to be spent over a period of five years.

Since it is estimated that 80% of Russian scientists and engineers read English, whereas only 5% of the American counterparts read Russian, there is bound to be a marked flow of knowledge in the wrong direction. The AIEE, in conjunction with the Pergamon Institute, will make available to its members translations of four leading Soviet scientific and engineering journals. For further information, contact N. S. Hibshman, Secretary, AIEE, 33 W. 39th St., New York 18, N. Y.

—EW—

REVERSE—Apparently the hare is chasing the hound in the interesting game of recruiting college seniors.

The Western College Placement Assn. was told at its annual conference in Portland that . . . "students are aggressively pursuing recruiters."

Wallace N. Jamie, director of public relations for the Carnation Co.,

COMING APRIL 1958

INSULDUR®

Major Breakthrough for Distribution Transformers J-70839

YOU CAN BE SURE...IF IT'S Westinghouse

NEW

high-speed high-power lightweight

CONDUIT BENDER

GREENLEE

No. 884 HYDRAULIC BENDER

- *90° bend with one ram stroke*
- Bends 4″ conduit 90° in 4 minutes with No. 798 Power Pump shown
- Handles 10 conduit sizes ½″–4″
- One man wheels it from job to job on its specially designed pipe supports
- Fast setup and operation by one man
- Two-speed power pumps for fast approach . . . 90° bend in 4″ conduit as fast as 30 sec with No. 797 Pump
- High-strength aluminum and steel construction for minimum weight, maximum strength
- Universal pipe supports rotate to handle all conduit sizes
- Front insertion and removal of conduit
- A dozen advanced features

WRITE FOR BULLETIN E-224

GREENLEE TOOL CO.
1763 Columbia Ave. • Rockford, Ill.

Los Angeles, said there will be more competition for jobs among graduating students.

"Intercompany piracy of help is now on the wane," he said. "Engineers are more polite and less patronizing . . . students are listening carefully."

A San Diego State College survey indicated a 29% drop in demand for college graduates with engineering recruitment off 34%. In the Northwest, however, a survey indicated the demand for engineers may hold steady through 1958, with the average salary to be paid about $468 a month.

—EW—

SIGN OF THE TIMES?—The main Hudson motor car plant in Detroit has been sold for a 20-acre shopping center. Those of us subject to nostalgia will remember when the "Super Six," not the super-mart, was king.

—EW—

GROWING—The electrical machinery manufacturing industry in the Los Angeles metropolitan area has the second highest percentage increase of the number of employees of all durable goods manufacturing industries.

Figures released by the Los Angeles Chamber of Commerce show the electrical machinery manufacturing industry increased its number of employees by 365.5% during the period 1949 through 1956. Pay rolls increased from 14,200 employees to 66,100.

The percentage gain was topped only by the increase in the military ordnance industry.

—EW—

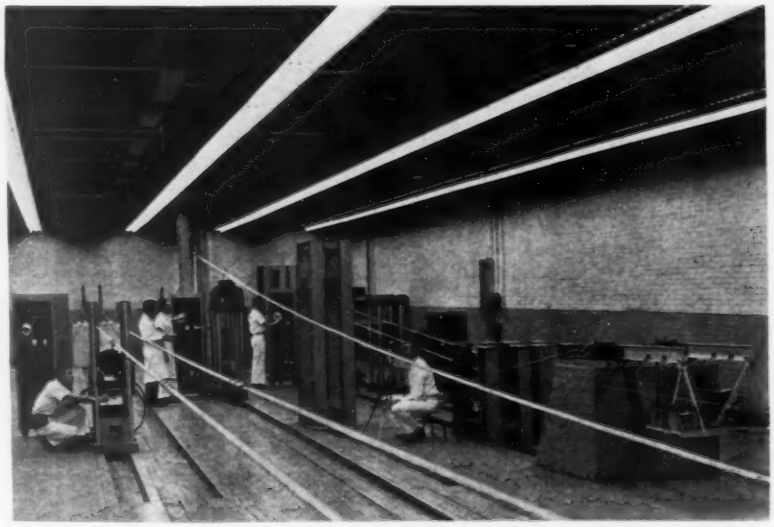
A heart attack in late January claimed the life of William J. McIlvane, 62, former executive vice-president of the Copperweld Steel Co.'s Wire and Cable Division, and a prominent friend of the electrical utility industry. He had retired in 1953 because of ill health.

—EW—

HONOR—AIEE Fellows' credentials were presented to Prof. Charles F. Dalziel of the University of California, and chairman of the AIEE San Francisco Section. He was transferred to Fellow grade . . . "for effective teaching of electrical engineering and original research on the effects of electric currents in the human body."

Professor Dalziel has been on the Berkeley campus with the Electrical Engineering faculty since 1932. He has been active professionally as consulting engineer, electrical expert and expert witness. His research work has included work on electric

Research Center for Industry



One of the outstanding research and engineering centers of its kind was recently opened by Preformed Line Products Co. in Cleveland. The new center was established to study physical problems of overhead transmission and distribution, and to step up the company's program of developing and improving line accessories. Here you see armor undergoing endurance tests on spans that simulate actual vibration

shock, safety and hazards, and power system stability and protection.

—EW—

WORRY WARTS—Living is so complicated these days folks don't even worry straight. We:

Worry about the Russians—then get run over by a neighbor.

Worry about radioactive fallout—then get poisoned spraying the flowers.

Worry about crashing in an airplane—then fall off a ladder painting the house.

Worry about becoming a success—then wrap it around a culvert.

Worry about getting the car greased every 1,000 miles—then never get a medical checkup.

Worry about polio—then get crippled up by a power lawnmower or homeshop power tool.

Worry about the spectacular and the unusual if you must—but remember the ordinary things and occurrences can kill you, too!

—From Utah Power & Light's Accident Prevention Report

—EW—

Graham Lee Moses, noted authority on electrical insulation, is to be one of the many outstanding men on the program of the Electrical Maintenance Engineers Assn. program March 28 at Shrine Exposition Hall, Los Angeles. Moses has been a design engineer since 1923, has written some 150 technical papers on the subject, and a book entitled "Electrical Insulation" which was published in 1951.

—EW—

The Population Reference Bureau says world-wide births exceed deaths by 123,000 per day—forecast a world population at a possible 6 billion by the year 2000 compared to 2.7 billion in 1955. Page Mr. Malthus!

—EW—

EDUCATIONAL FIRST—The Far West leads the nation in pay for beginning teachers, according to the Oregon Voter. Average beginning salary in Oregon, California, Nevada and California is $4,000. The U. S. average as a whole is $3,600.

Other significant points developed from the survey are: (1) half the young men and women who began teaching in 1956 expect to quit with-

IT PAYS TO HAVE HUBBELL WITH GOOD CONNECTIONS
ANNOUNCING
the new A.C.
presSwitch
Quality... you can put your finger on
UL
Cat. No. 1251-I
15 amps., 120-277 volts
Single pole A.C. "Presswitch"
with thru-connection and ivorine nylon button
Introducing "Presswitch," the revolutionary new Hubbell press-type A.C. switch . . . a press,it's on; a press,it's off . . . the smoothest, most convenient and most efficient A.C. switch in Hubbell's famous switch family. "Presswitch" responds to the gentlest press or touch of the finger or nudge of the elbow. It is as much at home in a factory as in a living room. Its attractive styling blends with any interior and its rugged, precision molded construction represents a new standard of durability and dependable operation.
Now available at your nearest Hubbell distributor in single pole, double pole, three-way and four-way.
HARVEY HUBBELL, INC.
HIGHEST QUALITY
WIRING DEVICES • MACHINE SCREWS
DEPT. R-1 BRIDGEPORT 2, CONNECTICUT
WIRING DEVICE OFFICE AND WAREHOUSE LOCATIONS
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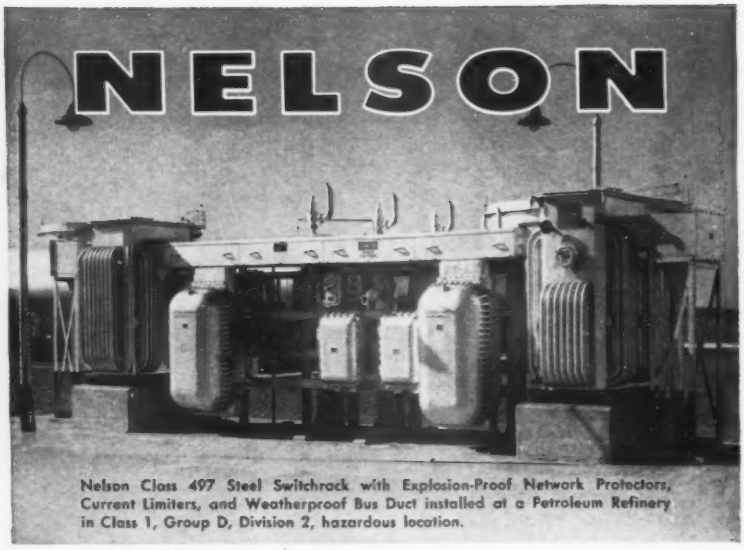

Nelson Class 497 Steel Switchrack with Explosion-Proof Network Protectors, Current Limiters, and Weatherproof Bus Duct installed at a Petroleum Refinery in Class 1, Group D, Division 2, hazardous location.

THE *dependable name for electrical control equipment in the petroleum industry.*

When control equipment is specified for Class 1, Group D, hazardous locations investigate NELSON . . . first. Be guided by 20 years of engineering and manufacturing experience that assures you of getting the highest quality, easiest installed electrical equipment.

For safe, dependable products, and personalized service, call your NELSON representative.

Among the explosion-proof products designed for Class 1, Group D, hazardous locations manufactured by NELSON are:

- CIRCUIT BREAKERS
- PANELBOARDS
- CONTROL STATIONS
- PIPE LINE SAMPLERS
- SWITCHRACKS
- MOTOR STARTERS
- CONTROL and TRANSFER SWITCHES
- JUNCTION BOXES
- HIGH-VOLTAGE MOTOR STARTERS

a major source of electrical control equipment for industry

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA

in 5 years; (2) of all graduates qualified to teach, only 30% chose to; (3) at the beginning of the school year there was a shortage of 135,000 teachers; (4) beginning teachers in 1956 were 38% male and 62% female.

—EW—

British scientists who are working in the field of thermonuclear reaction hope to obtain temperatures of 40,000,000 C by the end of this year in a new nuclear fusion device. Success with the experiment would be another step toward sustained fusion.

—EW—

NO MORE BEER—The time-honored practice of cashing the pay check at the corner saloon on the way home soon may succumb to the Electronic Age. Walter W. Finke, president of Datamatic, predicts even the pay check itself is on the way out. Instead an electronic brain will automatically credit the employee's salary directly to his account in a selected bank. Wives should cheer this development.

—EW—

Many in the industry have somehow associated Portland GE's hydro development on the Deschutes River—the Pelton project—with the Pelton Water Wheel Co. The fact is the name honors two brothers, James and John Pelton, who were prominent Oregon ranchers.

—EW—

Public Service Co. of Colorado has acquired a site and plans to build a $6,000,000 12-story office building in downtown Denver. Construction will start the second half of 1958.

—EW—

REVEILLE—Kanab, a quiet little Utah community, is getting ready for the boom that will come with the expanding construction on the multi-million-dollar Glen Canyon Dam project.

As construction population grows, the businessmen of the community are pacing the demand for services with new motels, restaurants, shops of all types and bringing with it the headaches that come from requirements of more water, sewage facilities and other services.

No. 3 in a series

Right off the Wire

A new system using multiple cathodes is said to double the life of the vapor lamps used on highways.

A thermionic converter has been made that produces electricity directly from heat with an efficiency of eight per cent.

Studies of the northern lights being made with a high-powered, long-range radar may disclose a method of defense against missiles coming over the arctic.

Submarine cable can be made in any length at the Simplex Submarine Cable Division's dockside plant. Single lengths are limited only by the capacity of a cable ship's hold, or the length of a train of gondola cars.

An electronic system of bank record keeping handles random-sized, unpunched paper checks at the rate of 1800 checks per hour to 40,000 accounts.

The world's largest solar furnace is being designed for installation in New Mexico. It will produce temperatures as high as 8,000°F.

Elimination of thermal noise by operating microwave amplifiers at the temperature of liquid helium has been found to greatly increase the range of radar.

An electronic map plotter is expected to make possible more accurate and cheaper maps from aerial photographs and to lend itself to the automation of mapping.

Plans are being made to mount telescopes on balloons in order to make observations above the interference of the earth's atmosphere.

The U. S. Air Force has patented an infrared television camera for use at night or in fog.

A new chemical plant will need no outside source of fuel after operation has begun. All the heat required will come from the process.

It has been found that one area of the human brain contains a record of every detail of the person's experience. Total recall can be produced by the stimulation of a minute electrical pulse.

Phosphors applied to textiles, sheet materials or metal mesh light up when a current is passed through them thus making draperies, for example, sources of illumination.

A new microscope for the study of living tissues uses bursts of ultraviolet light too brief (one thousandth of a second) to injure the tissue. The image appears in color on a television screen.

A new drug promises to save the lives of many persons who might otherwise die from lethal doses of radiation. It has been tried only on laboratory animals.

A form of fiber glass containing uranium 235 has been developed as a fuel for atomic furnaces.

A new amplifier is expected to extend the range of radio telescopes about ten times, enough to equal the best optical instruments.

A giant air mattress, equipped with arresting and launching gear, has been patented for use as a portable airstrip. On it planes could make belly landings without damage.

Tellurium lead cable sheath has excellent vibration, creep and age-hardening resistance, and greater flex life and tensile strength than other lead alloys, say Simplex scientists after exhaustive tests.

A new meter for oil pipelines will measure a flow of 10,000 barrels per hour (four times the capacity of present equipment) with an accuracy of one tenth of one per cent.

Simplex C-L-X (Sealex) metallic sheath is manufactured with thermoplastic covering in colors for voltage or general industrial coding.

A device called an "electronic sentry" guards against fire, abnormal pressure, high or low water levels, temperature changes and other hazards. It calls a designated person by telephone and gives a pre-recorded message.

"Tree" of Knowledge

This strange looking growth tells an important story to the expert eyes of Simplex scientists. It's a Simplex photomicrograph showing "treeing" effect that results when a 15 KV polyethylene-insulated cable is broken down by 100,000 volts. This is typical of the continuing research work done at Simplex.

If you are interested in the important facts that Simplex scientists Kitchin and Pratt have discovered on polyethylene treeing, write for their AIEE Paper No. 58-121.

SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

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Highest quality cables for: Mining
Power & Lighting • Construction
Transportation • Communications
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"The American manufacturers of transoceanic telephone cables"

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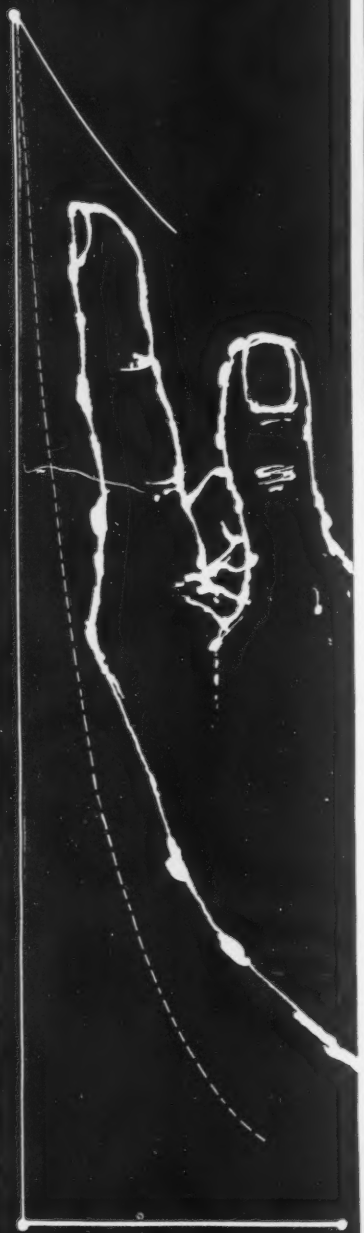


New Life Insurance
for Your Distribution
Transformer

J-70840

YOU CAN BE SURE...IF IT'S
Westinghouse

Distinguished Service Awards

Among several Westerners receiving Department of the Interior Distinguished Service Awards were Eugene C. Starr, chief engineer of Bonneville Power Administration, pictured at left, and Roger L. Conkling, right, who is now with H. Zinder & Associates, utility consulting firm. The award winners are pictured with William A. Pearl, Bonneville administrator. The award is the Interior Department's highest, and was earned by Starr and Conkling for outstanding achievements with Bonneville

EXACTING – Rome Cable Corp. has just filled – in the words of its engineers – "the most exacting job we've ever handled from the viewpoint of materials and the put up requirements."

The company supplied almost eleven miles of instrumentation cable for the Martin Co.'s new test grounds near Denver. Individual conductors, the individual pairs and the over-all cable assembly were given 100% inspection. Besides this, the cable is used without splices, and therefore had to be put up in 1,100-ft-long sections.

Special insulation and shielding required even more close attention to detail and use of special materials.

The Martin company is using the installation to gage rocket engine performance of the Titan missile.

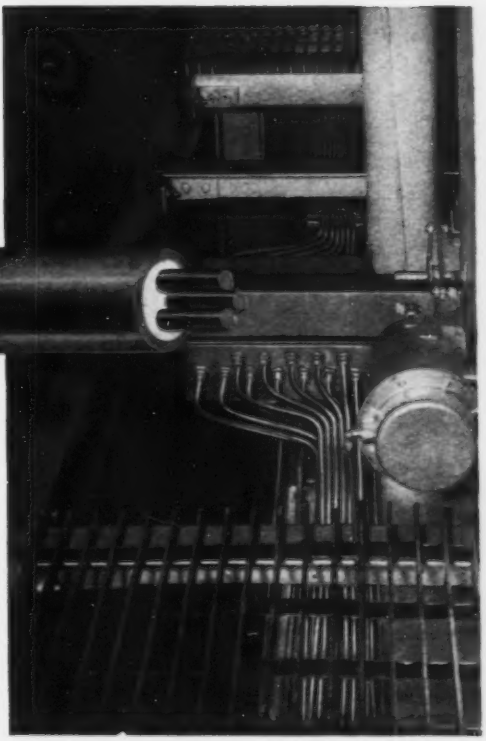
—EW—

PHILOSOPHY: The system by which a man can be unhappy intelligently.

M. M. Koch, left, vice-president of electric operations, Public Service Co. of Colorado, presents Electrical West authors' plaques to Julian R. Hayden, Robert L. Tilson and John E. Martin, electrical engineers. The three men devised a plan for standardizing distribution circuit protection methods on 13.2-kv feeders

SAFETY m.i. CABLE

the answer to industrial power wiring...



- SPACE SAVING
- Time saving
- Permanent
- INSTALLED EASILY
- Fast power wiring to cut down-time

More and more General Cable's Safety MI 600 Volt Wiring System is being used because it can take the abuse of industrial application, giving trouble-free operation and unexcelled performance under the most severe conditions. Particularly adaptable in hot and wet locations. Available in 1, 2, 3, 4 and 7 conductor for power and control circuits.

MI terminating in main Japan Oven control center switchboard at Painsett Lumber and Manufacturing Company, Anderson, S.C.

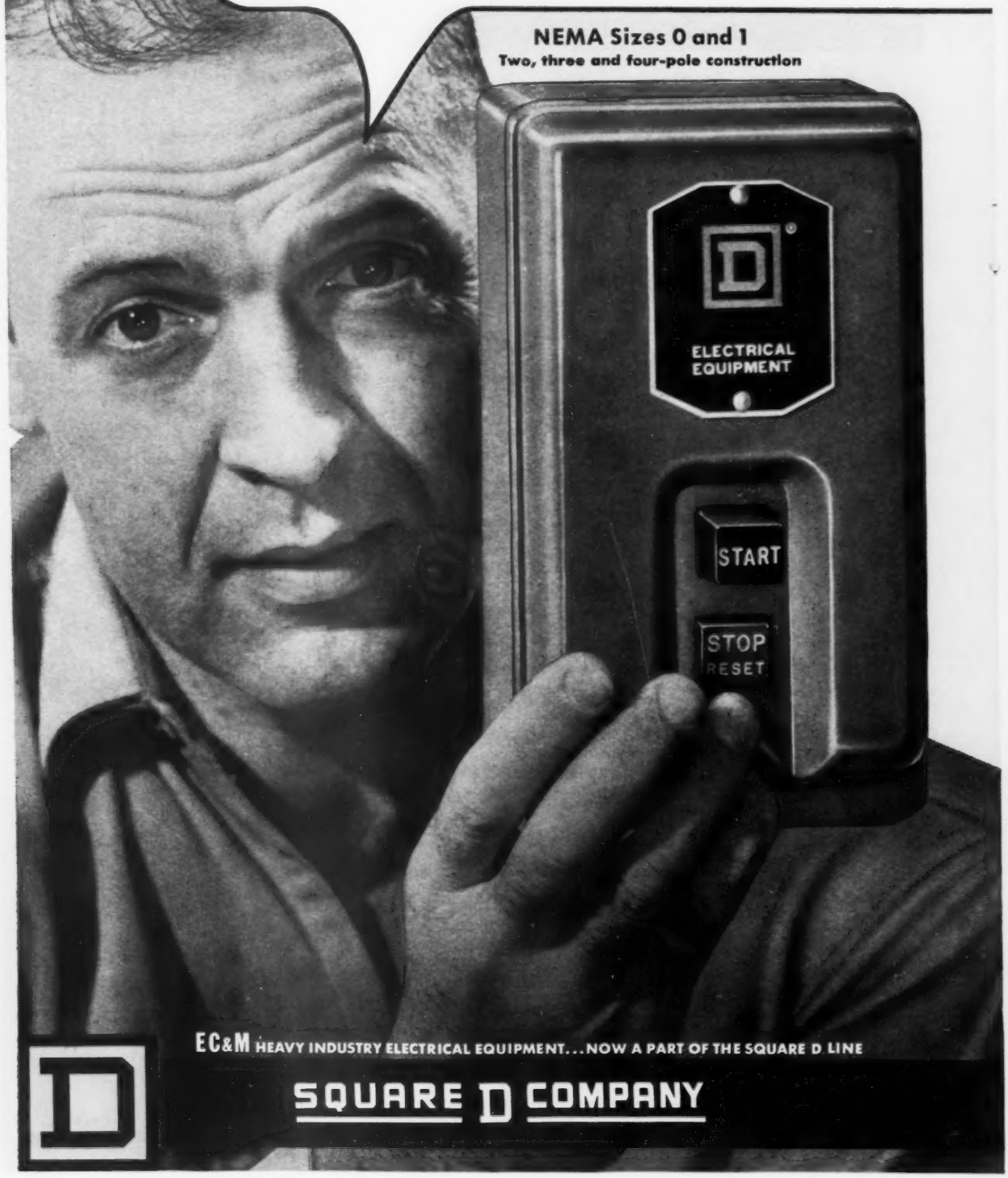
Ask for a Demonstration To-Day!

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.

Offices and Distributing Centers Coast-to-Coast

for quality and service... **specify GENERAL CABLE**

This NEW Manual



EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

Starter has EVERYTHING!

SMALLER!
Takes less space, whether it's built into machine or mounted externally

SMART STYLING!
Matches the streamlined appearance of today's modern machines

QWIK-MAKE, QWIK-BREAK!
Positive snap action opening and closing of contacts. Longer contact life

TRIP-FREE OVERLOAD PROTECTION!
Impossible for operator to hold motor circuit closed against overload

LONGER LIFE!
Toggle Action operating mechanism. Heavy duty construction throughout

EASIER INSTALLATION!
Wire it without removing starter from enclosure. All terminals have pressure wire connectors

EASIER MAINTENANCE!
"Off-the-Shelf" parts kits make normal maintenance and modifications easier than ever. They're easy to buy, easy to identify, and faster to install

TAMPER-PROOF!
Cover padlocking device prevents tampering by unauthorized personnel. Safety latch locks "start" button in "OFF" position

VISIBLE INDICATION OF OVERLOAD!
Self-centering pushbuttons show when overload has occurred

CHOICE OF ENCLOSURES

Water and Dust-Tight | Hazardous Locations | Flush Mounting

Fractional-horsepower manual starters are available in a full line of enclosures including General Purpose, Flush Mounting, Water and Dust Tight, and Explosion Proof

***Write* for BULLETIN 2510 B-C**

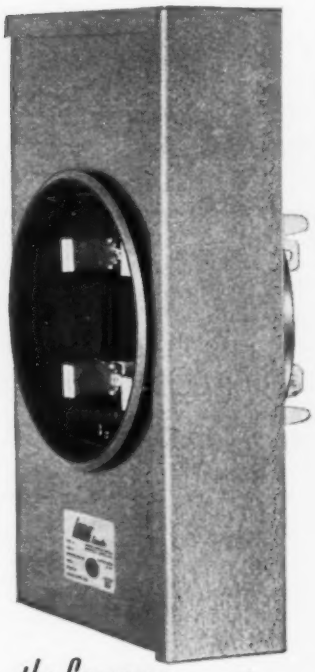
Address Square D Company, 4335 Valley Boulevard, Los Angeles 32, Calif.

NEW... 2 kvar SECONDARY CAPACITOR

provides low cost vars at point of *greatest system benefit*

Here's the answer to utilities looking for a more economical 240 volt secondary power capacitor. The Sangamo Secovar Capacitor installs right at the meter box to relieve the var load all down the line, to cut installation costs, and to conserve valuable pole space.

Installation is simple. No wiring changes are necessary. No special equipment is needed . . . one man can make the installation in a matter of minutes.

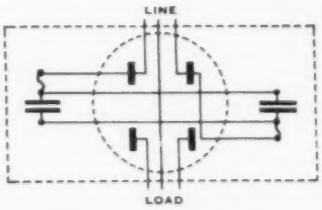


the Sangamo *Secovar Capacitor*

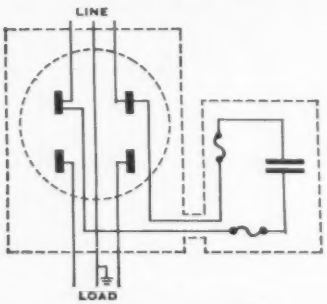
TYPE S for socket mounting

Combines a secondary power capacitor with a convenient socket mounting adapter. Mounts on a standard meter base—either vertically or horizontally. It contains two capacitor sections, each protected against line or ground faults. Available in 2 kvar, 240 volt rating.

WIRING DIAGRAM



WIRING DIAGRAM



TYPE N for adjacent mounting

Comes in a metal enclosure with an adjustable mounting bracket and a nipple connection for installation with standard indoor or outdoor service entrance equipment. Protected against either line or ground faults. Available in 1 kvar, 240 volt rating.

PC58-2

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

PRODUCT NEWS

New Designs and Applications

Terminal Connectors

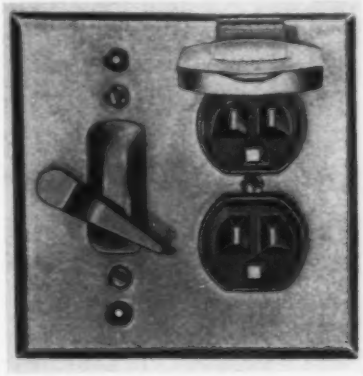
(1) *Burndy Corp., Norwalk, Conn.*

A weight reduction of about 100 lb has been made in transformer terminal connectors designed by this manufacturer. The connectors link 12 3¼-in.-od aluminum bus from the generator to copper studs for 13,800-v primary windings of a main transformer rated at 200,000 kva. They incorporate a 45° angle so the stud portion can be swung out of the way for access to transformer bushings. Each connector has a pair of copper plates bent at 45°. Copper braid provides the required flexibility. Protection from galvanic action between aluminum-to-copper contacts is by tin-plated ferrules on the ends of the braid that bolt to the aluminum casting. The other ends of the braid are bolted to silver-plated copper.

Lower Transformers

(2) *General Electric Co., Schenectady 5, N. Y.*

Height reductions of 9 to 12 in. have been made in this company's network transformers in order to permit utilities to save money on new vault construction and to pack more capacity in existing vaults. The new line includes three-phase ratings from 300 to 1,000 kva in the 15-kv class, and will later be extended to the 22-kv class.



Switch-Outlet Assembly

(3) *Perfect-Line Mfg. Corp., Hicksville, N. Y.*

A new weatherproof two-gang combination switch and dual U-ground receptacle assembly is now available from this company. It has hinged cover ready for installation in either two-gang box or FS flat-face fitting.

Circuit Reclosers

(4) *R&IE Equipment Division, I-T-E Circuit Breaker Co., Greensburg, Pa.*

What are reported to be the largest reclosers with self-contained reclosing mechanisms ever built are now in production by this company. They are 46-kv automatic circuit reclosers rated at 140 amp, and can also be supplied for 34.5-kv rating. Other ratings are available for 200, 280 and 400 amp. The two-cycle instantaneous tripping recloser has interrupting ratings of 4,000 amp, rms symmetrical for 34.5 kv; and 3,000 amp, rms symmetrical for 46 kv.

Dielectric Test Set

(5) *James G. Biddle Co., 1316 Arch St., Philadelphia 7, Pa.*

This company has designed a dielectric test set for measuring direct current at voltages up to 100 kv when applied to the insulation of electrical equipment such as generators, transformers, bushings, cable, etc. In two models of the tester, one improved and the other new, the company has incorporated a polarized primary that prevents the set from being raised above ground potential. Also included is a high-voltage reset button that prevents the high-voltage output being energized without the operator's knowledge. The important maintenance application of the instruments is for nondestructively detecting unreliable condition of insulation of new or repaired electrical equipment.

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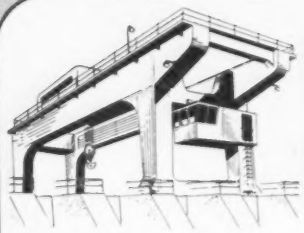

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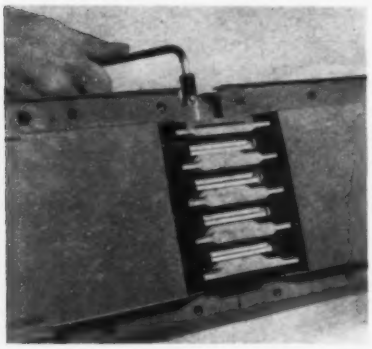


Busway For Aluminum

(6) *General Electric Co., Distribution Assemblies Department, Plainville, Conn.*

This company has designed a busway system to be used exclusively with aluminum conductors. A plug-in design rated 225 to 1,000 amp, the new busway is said to be up to 50% lighter and 30% smaller than other busway of comparable ratings. The busway is available in three-pole and three-phase, four-wire designs for maximum 600-v applications in industrial and commercial buildings. It offers as standard 50,000-amp RMS asymmetrical short-circuit capacity. Three design features said to help reduce installation costs are: (1) a one-bolt joint that can be tightened with a single key-type wrench; (2) snap-on hangers; (3) an adjustable length that allows a 1-ft adjustment of a run on the job site. It also can be hung on 10-ft centers instead of the usual five.

Dry-Type Transformers

(7) *General Electric Co., Schenectady 5, N. Y.*

A new standard line of sealed dry-type transformers featuring aluminum conductors and buswork is available from this company. Aluminum conductors make the use of welded internal joints more practical and provide a "continuous conductor" construction. By eliminating bolted or other high-resistance joints, the possibility of deterioration between the conductor and bus caused by heat cycling or oxidation of conductors is reduced to a minimum. Another feature of the new transformer includes a substantial weight reduction. The weight of a typical 750-kva unit is reduced approximately 1,700 lb through the use of aluminum windings and other design refinements.

Measuring Wheel

(8) *Rolatape Inc.*, 1741 14*th St.*, *Santa Monica, Calif.*

Distance measurements can be made conveniently from a moving vehicle with this new extended-handle measuring wheel. The 30-in. handle enables the driver of a car to guide the measuring wheel with ease while operating the car at a moderate speed, according to the manufacturer. Measurements are recorded in feet up to a distance of nearly 19 miles. A special stand enables the driver to park the measuring wheel in an upright position without leaving the car.

Tap Changer

(9) *RT&E Corp., Waukesha, Wis.*

This company has redesigned and repositioned its externally operated tap changer for distribution transformers. The new tap changer body is molded in one piece, multiskirted for long creepage and high surge strength. Contact is made through a bridging roller, under spring pressure. The switch is operated by removing the screw-on-type cap, reversing it and using it as the handle. A keying action makes it necessary that the switch be positively in tap position before the handle can be removed.

Appliance Load Centers

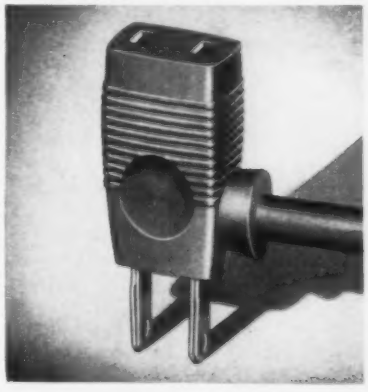
(10) *Westinghouse Electric Corp., Box* 2099, *Pittsburgh* 30, *Pa.*

This company announces two new automatic appliance centers designed for installation between studding in the standard 4-in. wall to provide adequate house power for small electrical appliances. Can be installed in kitchen or dining area. A single three-wire, 230-v single-phase circuit is split into individual 115-v outlets, which permits the operation of as many as five appliances at once. Equipped by push-button reset circuit breakers in each outlet. Three of the five outlets can be timed automatically by the clock timer. Two other models have four outlets each. One of the two has two retractable cords and two plug-in receptacles and a clock timer, the second has four plug-in receptacles and a minute-minder signal.

High Bay Reflectors

(11) *Holophane Co. Inc.*, 342 *Madison Ave., New York* 17, *N. Y.*

This company has designed two new high-bay reflectors for 1,000-w mercury vapor lamps. One has open-yoke construction for areas with solid ceilings, the other has a protective drip shield for areas with skylights, such as heavy industry machine shops. Each unit consists of only two parts: a ventilated socket yoke, with or without protective drip shield, and a covered reflector assembly.



Power Plug

(12) *Miller Electric Co.*, 120 *Main St., Pawtucket, R. I.*

A new series attachment plug for remote switching or control of light-

COMING APRIL 1958

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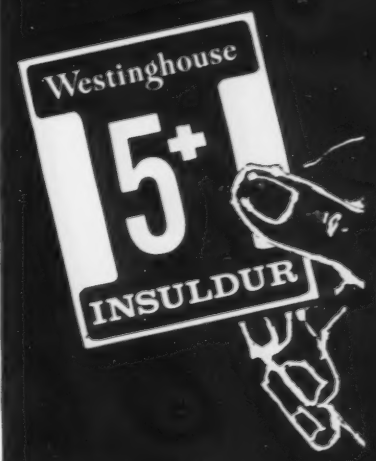

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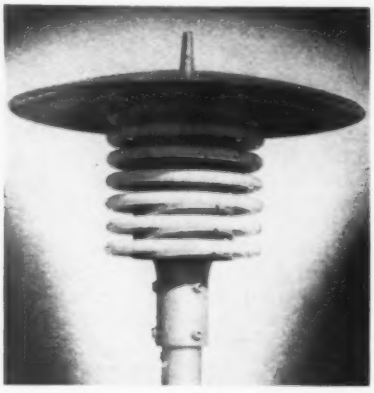
ing or appliances is molded onto the cord set of the controlling or switching device in a unit offered by this company. The unit is plugged directly into any power outlet and the appliance to be controlled is plugged into the outlet on the end of the series attachment cap. Used with two-conductor wires, any simple switching device controls the power to this outlet.

One-Piece Connector

(13) *Anderson Electric Corp., Box 2151, Birmingham 1, Ala.*

High conductivity and greater durability are features claimed for a new one-piece connector announced by this company. The one-piece construction makes possible a three-step installation: hook on the main, insert the tap and tighten. It is available in seven sizes, and a center cover-all spacer of pure aluminum is supplied with the four larger sizes.



Fluorescent Outdoor Lights

(14) *The Kenworth Co., Winsted 1, Minn.*

This new luminaire is designed for standard 40-w circular fluorescent lamps for use in parking lots and other outdoor areas. As many as eight lamp modules can be installed on one pole by plugging modules into each other, to meet various lighting requirements from 2,500 to 20,000 lumens. Components are aluminum.

Cable Clamps

(15) *Richco Plastic Co., 4445 W. Fullerton Ave., Chicago 39, Ill.*

A new line of all-nylon cable clamps has been announced by this company. The line is comprised of 13 sizes from ⅛ in. to 1 in. inside diameter, and are ⅜ in. wide in sizes up to ½ in. and 9/16 in. wide on the larger sizes. Successful applications are reported to be in holding wire, cable, tubing, condensers and cord sets.

Air Circuit Breakers

(16) *Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.*

A new 600-v, 15- to 4,000-amp, metal-enclosed switchgear with three-position breaker design is now available from this manufacturer. The interrupting rating of the units are from 15,000 to 100,000 amp. With the circuit breaker in any of its three recognized positions – connected, test and disconnected – the door of the breaker compartment can be closed. Indication of the breaker position is provided by two white lines on the mechanism. The three-position feature is said to offer additional convenience and safety to operating and maintenance personnel.

Insulated Headgear

(17) *E. D. Bullard Co., 2680 Bridgeway, Sausalito, Calif.*

This new design in insulated head protection is said to provide protection to head and neck against impact from falling or flying objects and from electric shock and burn. There is no metal in the hat suspension or chin strap. Hats are said to pass mechanical proof tests and electrical proof tests specified by Edison Electrical Institute and the U. S. government. Colors available are white, yellow, gray and orange.

Receipt Machine

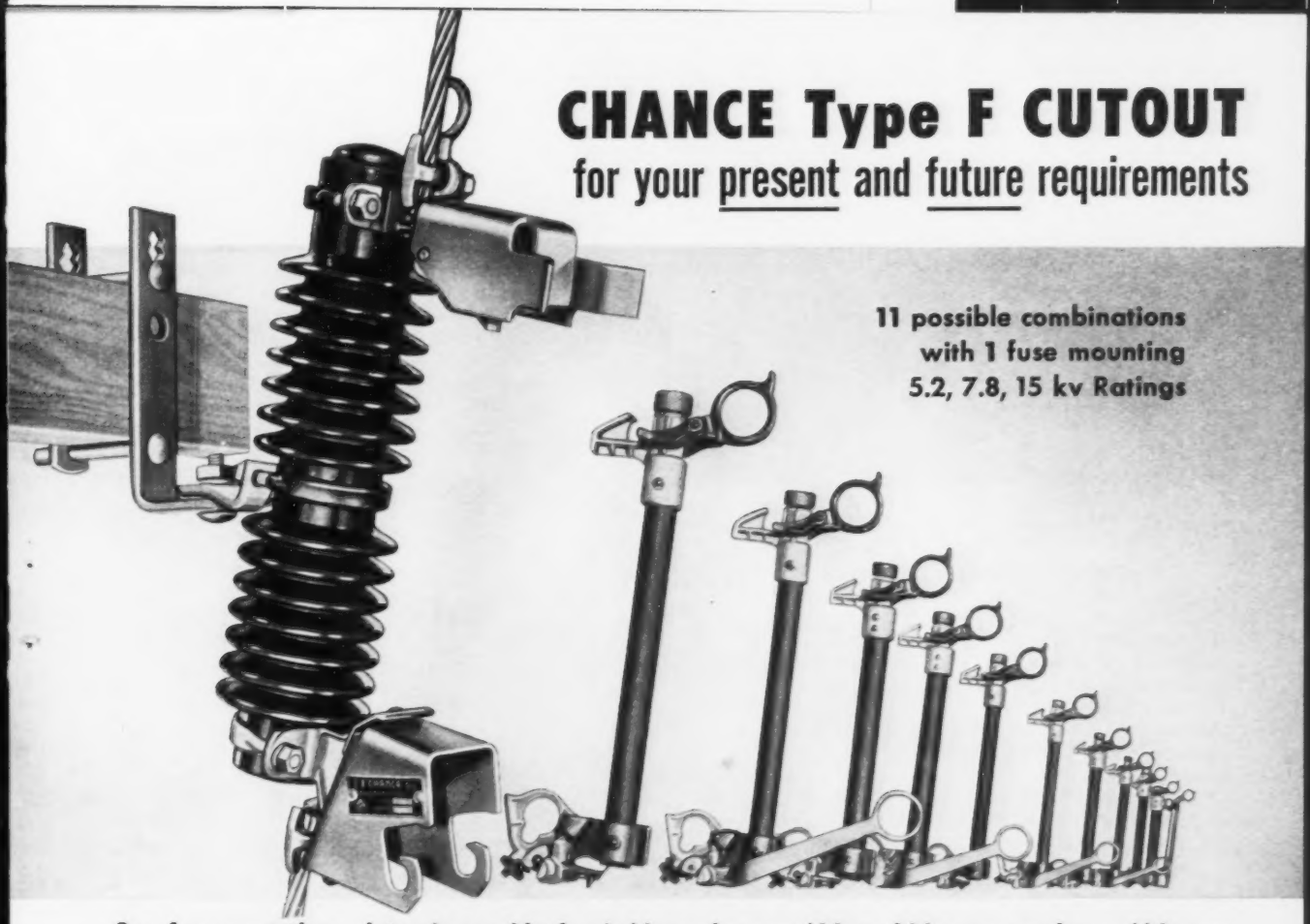
(18) *Heller Roberts Mfg. Corp., American Perforator Division, 700 Jamaica Ave., Brooklyn 8, N. Y.*

An electrically operated, motor driven machine has been designed to record receipt of payment on post-card-type bills that are used in conjunction with punch-card tabulating systems.

Fill in coupon on page 31

CHANCE Type F CUTOUT

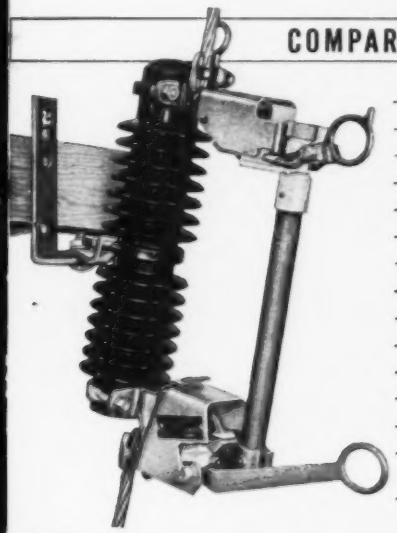
for your present and future requirements



11 possible combinations with 1 fuse mounting 5.2, 7.8, 15 kv Ratings

One fuse mounting—interchangeable fuseholders give you 100 or 200 amp regular or 100 amp load break cutouts—interrupting capacities 2000 to 12000 amps, plus a disconnect

Simplify your cutout stocking problems... lower your storage, handling, and installation costs . . . with the Chance Type "F" line of cutouts. You stock only one type of fuse mounting and a choice of fuseholders for complete system protection. Choose from *eleven* different combinations, including a disconnect, to fit your exact needs. When you want to up-rate an installed cutout or convert it to a load break, a simple change of fuseholders does the job—*in the same fuse mounting!*



COMPARE THESE 16 FEATURES

- Interchangeable Fuseholders Covering Complete NEMA Range
- Wrap Around Insulator Bolts
- Bird Proof Construction
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- Link Ejector
- Load Break
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- NEMA Standard Mounting Bracket

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Chance F Cutouts with Chance Fuse Links give complete system protection without unnecessary interruption

Chance (REA Accepted) Fuse Links are made on high precision automatic machines that give you the uniform quality vital to proper system and equipment protection.

Packaged in snap-open boxes, completely identified for stock.

Write for "*Fuse Links and How to Use Them.*"

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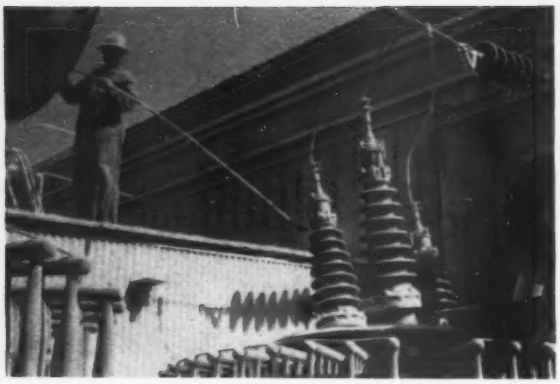


Insulator Cleaner

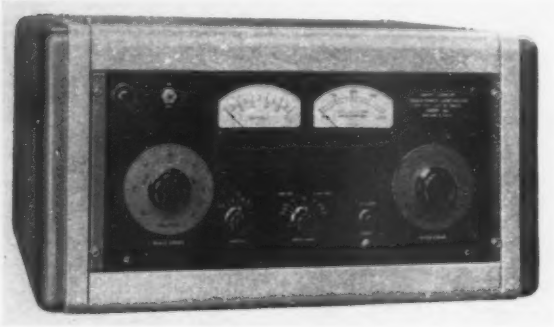
(19) *Airpowered Hot-Stick Inc., Box* 161, *Compton, Calif.*

A new product of this company is a device for cleaning insulators or substations without de-energizing. Compressed air is delivered to a metering device at about 100 to 125 psi. The air passes through a dryer, and then is divided into two air streams, one of which forces cleaning compound into the second. Air and cleaning compound are then conducted through a nonconducting rubber hose and through a hollow rigid nonconducting rod to the object to be cleaned. Photo shows the device in use on an energized 69-kv substation.

Microwave Slide Rule

(20) *Motorola Inc., Microwave & Industrial Control Department,* 1400 *N. Cicero Ave., Chicago* 51, *Ill.*

Utility communications engineers will be interested in a new slide rule designed by microwave engineers at Motorola. The slide rule was designed to simplify calculations of path loss, antenna gain, fade margin, carrier-to-noise ratio and other mathematical manipulations required for planning a microwave communications system. The slide rule itself contains 28 scales and is used on both sides.



Transformer Comparator

(21) *Knopp Inc.,* 1307 *66th St., Oakland* 8, *Calif.*

According to the manufacturer's specifications, this new current transformer comparator features freedom from effects of stray fields, harmonics and heavy overload test currents. With self-contained ammeter of 1-, 10- and 20-amp ranges, the total burden imposed upon either the standard current transformer or the transformer-under-test is less than 0.1 va. Included also is a detector for wrong polarity or other improper transformer connections. Normal full-scale error ranges are 0.64% in ratio error with 0.01% divisions and 35 minutes in phase error with one-minute divisions. A range switch affords a multiplying factor of 10.

Pole Setter-Borer

(22) *Four Wheel Drive Auto Co., Clintonville, Wis.*

A new four-wheel-drive earth-boring and pole-setting vehicle, first rubber-tired chassis of its kind designed especially as a digger-carrier for utilities, has been announced by this company. It is designed for spot installation of new and replacement poles, and for operations ordinarily requiring crawler tractors. The utility vehicle has rear-mounted digger and winch, and can be equipped with additional front-mounted winch or with an aerial tower. Has forward seat and controls for driving, and rear seat and platform for digging and pole setting. Digger unit rests in a cradle alongside driver in transit.

Distribution Transformer

(23) *Westinghouse Electric Corp., Box* 2099, *Pittsburgh* 30, *Pa.*

A new 250-kva pole-mounted distribution transformer is now available from this company. The new unit extends ratings in the line from 167 kva, largest units previously manufactured, and is said to be especially suited for applications in congested areas. Weight is about 1,700 lb.

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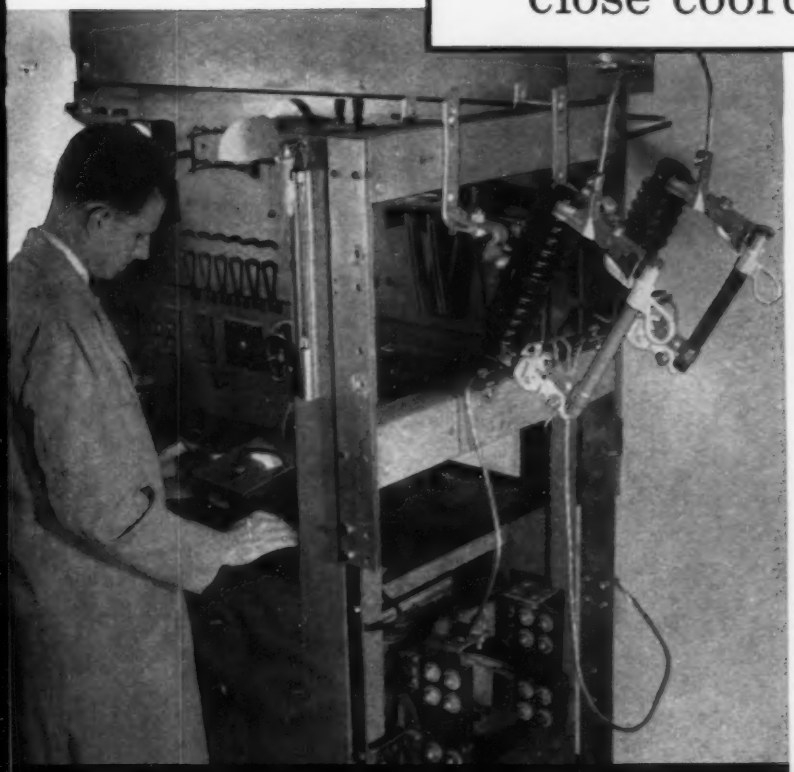
It takes KEARNEY QUALITY in Fuse Links

to give you positive protection . . . close coordination



Controlled manufacture and rigorous testing provide maximum service continuity

Quality control in KEARNEY Fuse Links starts with design . . . and continues through careful selection of materials, precision parts manufacture, expert assembly and strictest inspection and testing. The end result is dependable protection . . . uniformity that guarantees all Fuse Links of the same rating will perform exactly alike.

ALL KEARNEY Fuse Links feature low temperature operation. Pure tin elements or low melting point solder, selected for proper strength and melting temperature for each current rating, keep temperatures inside the cutout tube well below charring point. This provides accurate, positive arc clearance even after long periods of overload.

Take care of your requirements in Specialized and Standard Fuse Links with KEARNEY. Contact your KEARNEY Representative.

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Specify Kearney Products

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, Inc.,**
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LONG-LASTING PROTECTION FOR YOUR OVERHEAD SYSTEM

with

BLACKBURN *Grounding* DEVICES

Type GTC 1
One plate tower ground clamp

Type GTC 2
Two plate tower ground clamp

Copper Bonded Pigtail

Type GUV
U-bolt ground clamp parallel or 90°

Steel Driving Stud
for Sectional Ground Rods

Type GG
Ground Rod Clamp
Socket set screw

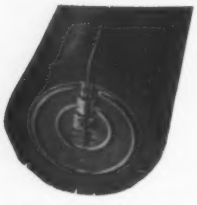
Copper Alloy Coupling
for Sectional Ground Rods

Copper Bonded Sectional Ground Rods

Copper Bonded Regular Ground Rods

Type GGH
Ground Rod Clamp
Square head bolt

Type B
Budget Line Ground Rod Clamp
Square head bolt



Type GP 100
Electrolytic Copper Pole Bottom Plates
7½", 10", 14" dia.

Blackburn grounding devices will save you thousands of dollars annually in preventing burnouts of expensive overhead equipment. This complete line simplifies your stocking problem—one source for all your needs. Like all BLACKBURN products they are constructed of high-strength corrosion resistant materials—designed for easy installation and engineered for long-lasting, trouble-free grounding. Always specify BLACKBURN.

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BULLETINS ETC.

(24) PANELBOARD — A new heavy-duty fusible power panelboard, incorporating rigidly mounted quick-make, quick-break fusible switch units, is the subject of a new four-page bulletin issued by the Distribution Assemblies Department, General Electric Co. The bulletin lists features, application data, description, selection information, horsepower ratings, dimensions, modifications and ordering directions. Write to the department at Plainville, Conn. Ask for bulletin GEC-1382A.

(25) SUPERVISORY CONTROL — Bulletin GEA-6603 of General Electric Co. carries descriptive information as to the what, why and wherefores of supervisory control equipment. Functions ranging from opening and closing of switches and valves, to adjustments of speed, voltage or load are described. Write to the company at Schenectady 5, N. Y.

(26) DISCONNECTING SWITCH — Bulletin GEA-6397 of General Electric Co., Schenectady 5, N. Y., provides basic data on a new rotating-insulator, vertical-break air switch rated 69 kv-HD through 345 kv, 600, 1,200, 1,600 and 2,000 amp.

(27) CONTROL CATALOG — Zenith Electric Co., Department EWS, 152 W. Walton St., Chicago 10, Ill. This company is offering a new 64-page, two-color brochure on all types of automatic electrical control equipment. Gives detailed information, technical data and prices. Indexed for convenience.

(28) STEEL RACEWAYS — "Design Manual on Steel Electrical Raceways" is the title of a new publication available from the American Iron & Steel Institute, 150 E. 42nd St., New York 17, N. Y. The book provides the designer with fundamental information about electrical wiring systems using steel raceways, and makes it easier to apply the basic code provisions that exist without actually using the code as a design handbook.

(29) FLUORESCENT BALLASTS — Advance Transformer Co. has published a new Fluorescent Lamp Ballast Data Book. It contains information on ballast circuits, fluorescent lamp ballast construction, supply voltage and frequency, radio interference, ventilation and cold weather operation, testing fluorescent lamp ballasts and other pertinent data. Write to the company at 2950 N. Western Ave., Chicago 18, Ill.

(30) SUBSTATION STRUCTURES—A new manual describing and illustrating Line Material Industries' simplified method of erecting standardized substation structures is now available. Procedures designed to economize system expansion are applicable to substations ranging from 5 to 161 kv. Write to Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.

(31) SECONDARY CAPACITORS — Bulletin GEA-6670 of General Electric Co. discusses applications, engineering features, simplified installation and maintenance of residential secondary capacitors. Designed for 240-v secondary systems, the capacitors are said to offer an easy, inexpensive means of relieving overloaded transformers serving low power factor loads. Write to the company at Schenectady 5, N. Y.

(32) ELECTRICAL OIL—Silicones Division, Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y., is offering a data sheet on its L-45 silicone oil, electrical grade.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after May 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

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*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

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More KVA
From Your
Distribution
Transformer
J-70842

YOU CAN BE SURE...IF IT'S
Westinghouse

SPECIALLY DESIGNED HUBBARD BRACKETS ANSWER ALL THE REQUIREMENTS FOR FLUORESCENT LUMINAIRES

Supporting the weight of a heavier fixture is only one of three important requirements for fluorescent luminaire brackets. The design must also be able to withstand 100 mile per hour wind velocities applied over a larger projected luminaire area as well as support the added seasonal weight of an increased snow- and ice-loading area.

Not content with laboratory tests alone to indicate the importance of "weather factors," Hubbard and Company made field installations to subject various designs to actual service conditions. One of the early observations made during this testing was the conclusion that "heavied-up" models of brackets designed for mercury vapor and filament type fixtures do not make satisfactory supports for fluorescent luminaires. As a result of this testing, an entirely new line of Hubbard galvanized steel Street Lighting Brackets has been developed especially for fluorescent installations.

Write us for more information on the two designs shown, as well as a description of other styles available.

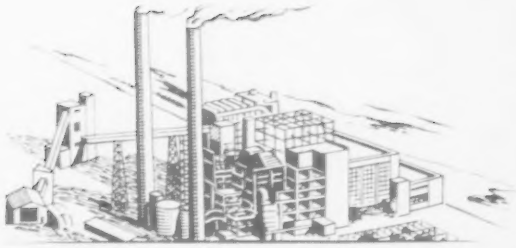
HUBBARD AND COMPANY

Pittsburgh 1, Pa. • Chicago 50, Ill. • Oakland 8, Calif. • Plano, Texas

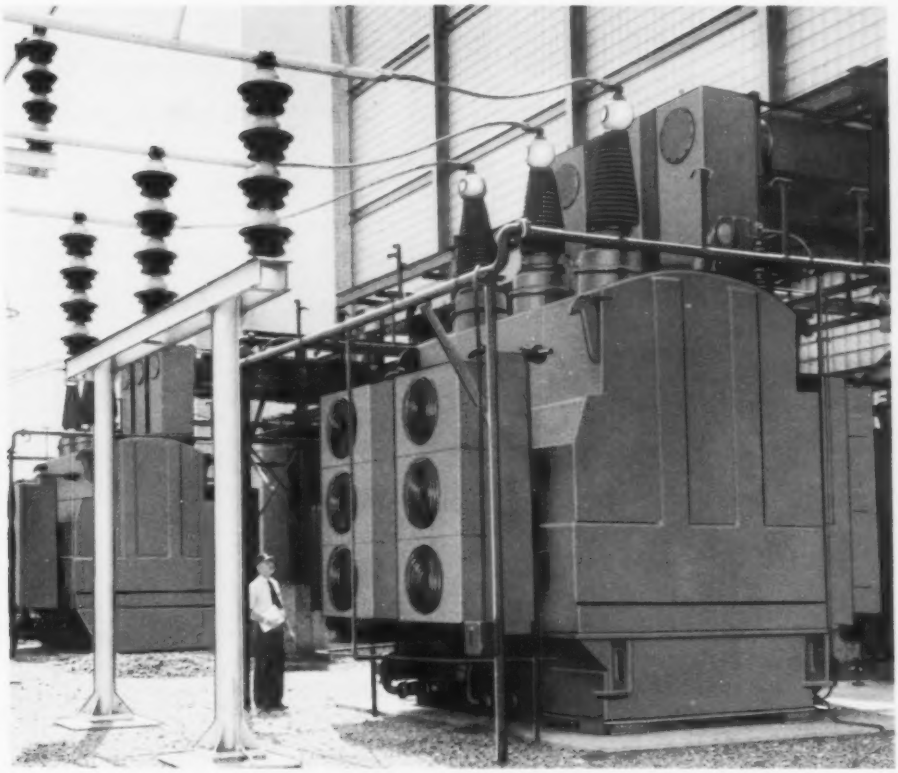
"Dancing in the wind" has been eliminated by angle steel "tie rods" and specially designed bracing in new Hubbard designs. (Below) Stock No. 23032, for use with luminaires with a maximum projected area not to exceed 8 square feet. Extension from pole—4 feet. Rise—14 inches. (Above) Stock No. 23908, for use with luminaires with a maximum projected area not to exceed 8 square feet. Extension from pole—approximately 8 feet. Sizes to 20 feet.

240,000 Kva

ON UNIT NO. 2 at CROMBY



Philadelphia Electric chose PENNSYLVANIA!



TWO 120,000 KVA PENNSYLVANIA POWER TRANSFORMERS were selected for main step-up service on generating unit No. 2 at Philadelphia Electric Company's Cromby Station. The transformers have a high voltage rating of 145,000 Grd.Y volts and a low voltage rating of 19,800Δ volts.

Located on the banks of the Schuylkill River near Philadelphia, Cromby Station has a potential generating capacity of 385,000 kw. This represents approximately 15% of the total effective system generating capacity of Philadelphia Electric Company.

Serving as important links in this newest addition to Philadelphia Electric's system, two three-phase, 120,000-kva Pennsylvania Contour Design Power Transformers step up the generated voltage of 19,800 volts to a transmission voltage of 145,000 volts. The shell form transformers were designed to operate during flood water levels up to four feet above the transformer bases.

In keeping with Pennsylvania Transformer practice, both transformers were shipped to Cromby in an upright position, completely assembled except for bushings and forced cooling equipment.

You, too, can rely on Pennsylvania to satisfy the most exacting power transformer requirements. For a discussion of problems or a quotation on your next installation, write to Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

PENNSYLVANIA POWER TRANSFORMERS

See next page for design details

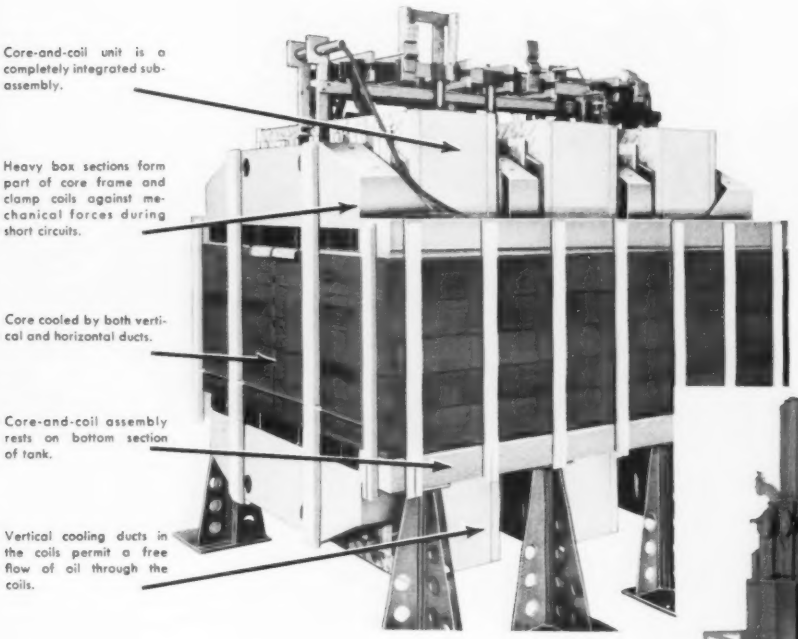
120,000 Kva PENNSYLVANIA

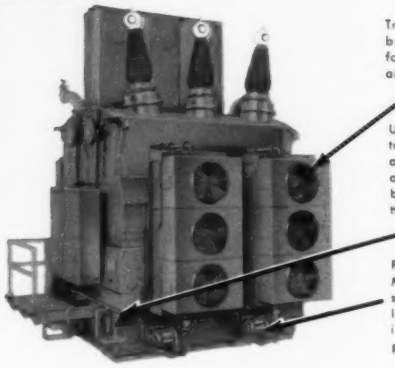
CONTOUR DESIGN—GENERATING STATION

Power Transformers . . .

MEET THE CHALLENGE

at Philadelphia Electric's Cromby Station


Core-and-coil unit is a completely integrated sub-assembly.
Heavy box sections form part of core frame and clamp coils against mechanical forces during short circuits.
Core cooled by both vertical and horizontal ducts.
Core-and-coil assembly rests on bottom section of tank.
Vertical cooling ducts in the coils permit a free flow of oil through the coils.


Transformer cooled by means of four forced-oil to forced-air heat exchangers.
Upper section of tank fits over core-and-coil assembly and is welded to bottom section at this point.
Pennsylvania Seal-Master® Pump is self-contained, self-lubricating, and has integral motor-pump shaft.

One of two such transformers on generating unit No. 2 at Cromby. 120,000 Kva, Three Phase, 60 Cycles, 55°C. Temperature Rise. Forced-oil to forced-air heat exchangers. High voltage: 145,000 Grd. Y volts. Low voltage: 19,800Δ volts.

PENNSYLVANIA HAS THE *FACILITIES* AND THE *CAPABILITY* TO MEET THE LARGEST POWER TRANSFORMER REQUIREMENTS

- A large, expertly-staffed engineering department with long experience in power transformer design — both core form and shell form.
- The ability to design and construct full-scale test models for proving design characteristics.
- A modernly equipped plant capable of producing and testing the highest rated units contemplated by the industry today.
- Handling and loading facilities that permit full utilization of manufacturing, shipping and installation economies.

OTHER PENNSYLVANIA TRANSFORMERS AT CROMBY STATION

Auxiliary Power Transformers—Two 7500/9375 kva, 20—4.16 kv units.
One 10,000/12,500 kva, 34.4—4.16 kv unit.

Load Center Transformers—Three 250 kva, 4160—120/240 volt Silicone-Insulated, sealed dry type units.

Making a total of 272,000 kva in transformer capacity supplied by Pennsylvania Transformer

PENNSYLVANIA TRANSFORMER DIVISION

McGraw-Edison Company

CANONSBURG, PENNSYLVANIA Greater Pittsburgh District

See other side for installation view

Soggy land and heavy reels of Okonite Cable presented a rugged installation problem. But by digging a 4-foot trench, and by "putting the Cat before the truck before the float," Guarantee Electrical Co. laid down two cables simultaneously at three miles per hour. Cables were a 15kv, 3-conductor Okolite-Okoprene submarine power cable and a 24-conductor Okolite-Okoprene submarine control cable designed to assure the continuous water supply essential to plant operation.

"We specified Okonite because...

This tough installation called for top-quality cables to assure continuous plant operation"

"Demanding assignments are 'our meat'," says Arthur Kaspar, Chief Electrical Engineer of Guarantee Electrical Company of St. Louis. "A good example is our recent cable installation for a large plant here in Missouri.

"Our client specified a never-failing, 24-hour-a-day, controlled source of plant water. The best pumping station site was miles from the plant, in low-water marsh land subject to periodic flooding from the Mississippi River—up to 25 feet above river level. One thing was certain... this called for really dependable cables for power and for control of the complex pumping station that would supply the water to the plant.

"Another thing was certain, too ... this was a job for Okonite. Our experience has taught us that Okonite gives maximum insurance and value where dependability in vital circuits is concerned."

Conferences between Mr. Kaspar and Okonite developed the proper cables: unaffected by water, highly resistant to soil conditions and other factors that attack *any* buried or submerged cable, and backed up by Okonite's 78 years of making highest-quality cable.

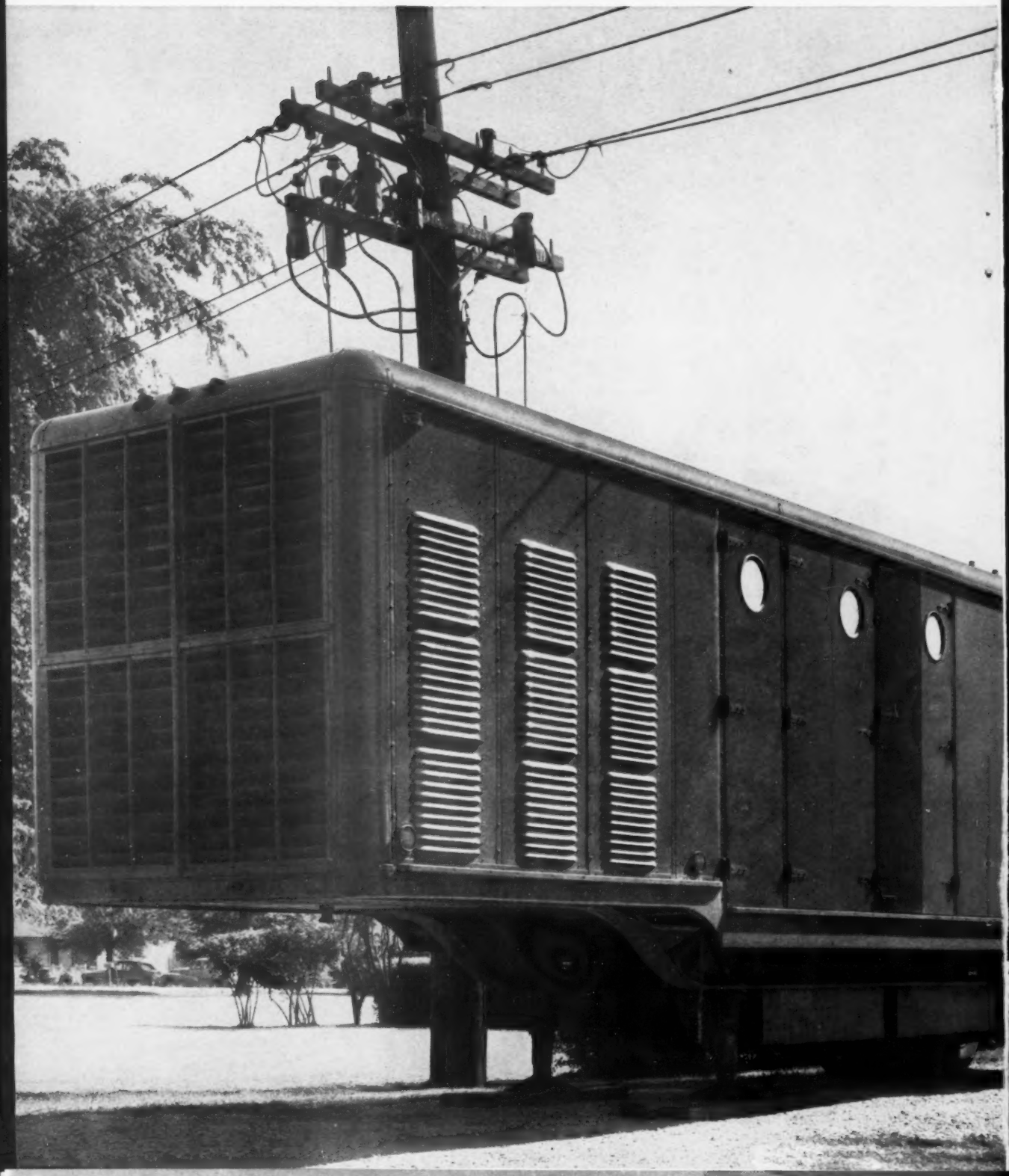
* * *

For your vital circuits, take a tip from Mr. Kaspar and other leading electrical engineers and specify Okonite. Whatever the installation, when you talk to Okonite you'll get an unprejudiced recommendation for your cable needs because Okonite, *and only Okonite*, makes cable by all four insulating methods: strip, dip, extrusion and taping. The Okonite Company, Passaic, New Jersey.

5248

***where there's electrical power... there's* OKONITE CABLE**

Line relocation



need not be costly

Not, that is, when work can be completed during regular hours and without interrupting service. And many utilities are doing just that—paring the high cost of line relocation and other maintenance and repair needs—with versatile Electro-Mobile generating units.

For example, a 500 kw trailer like the one shown here can travel most anywhere, pick up a load in minutes. Crews can do their work faster, at lower cost, and all the while *normal service* is maintained.

Further, these units can be utilized as an immediate source of emergency power. Their quick mobility can provide the means to continued service, and continued good public relations.

The economies of Electro-Mobile Power have been demonstrated on many utility applications. Why not ask your Electro-Motive representative to outline briefly ways these trailer units can help improve service and lower costs for your system?

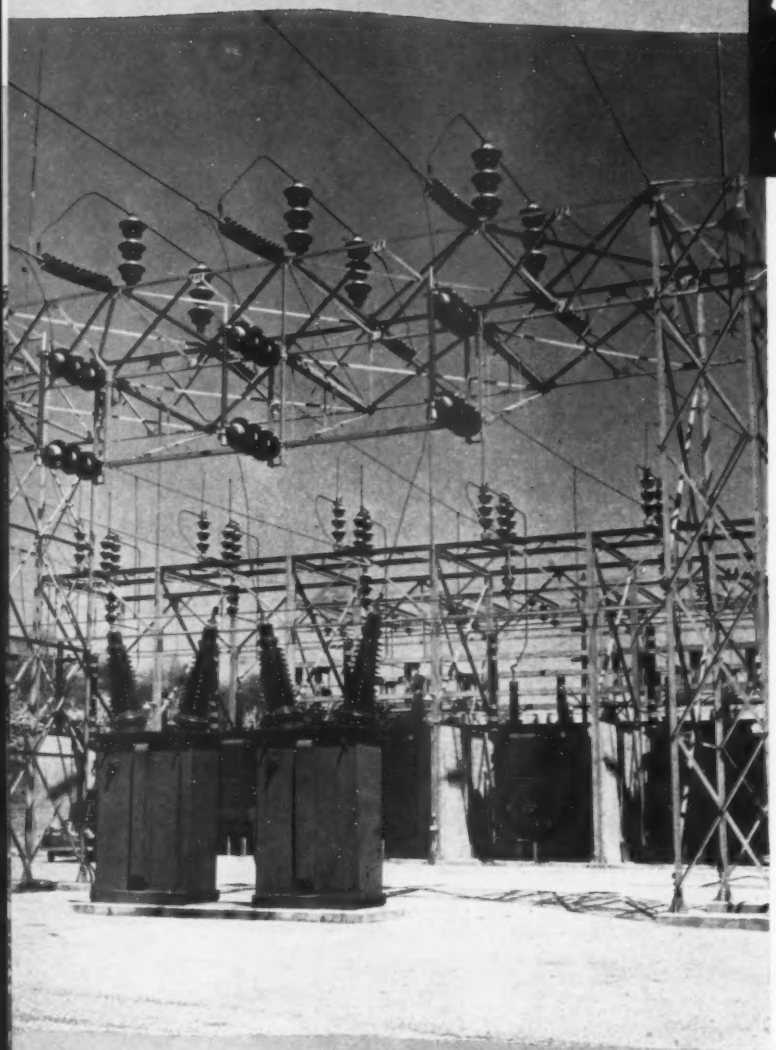
1000 kw units for use on sidings or placed on piers for semi-permanent use.

500 kw units offer excellent mobility for many temporary applications.

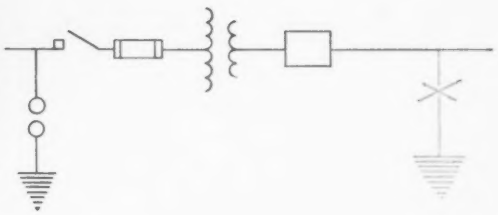
LIVE BETTER ELECTRICALLY

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS

Sales offices in Chicago, New York, St. Louis, San Francisco
In Canada: General Motors Diesel Limited, London, Ontario



Can a primary power fuse "see" line-to-ground secondary faults?...



(Although the data illustrated are for self-cooled transformers, similar tables are available for forced-air-cooled transformers.)

POWER TRANSFORMERS

***TABLE 3 Minimum Ampere Ratings for the Primary Fusing of Three-Phase or Banks of Three Single-Phase Self-Cooled or Water-Cooled Power Transformers**

Nominal System Kv →	23		27.6		34.5		46		69		115		138	
Transformer 3-Phase Kva ↓	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)
1000	25.1	40E	21	30E	16.7	25E								
1500	37.7	50E	31.4	50E	25.1	40E	18.9	25E	12.5	20E	7.6	10E	6.3	10E
2000	50.3	65E	41.8	65E	33.5	50E	25	40E	16.8	25E	10	13E	8.4	13E
2500	62.8	100E	52.5	80E	42	65E	31.5	50E	21	30E	12.5	20E	10.5	15E
3750	94.3	125E	78.5	125E	63	100E	47	65E	31.5	50E	19	25E	15.7	25E
5000	126	175E	105	150E	84	125E	63	100E	42	65E	25	40E	21	30E
7500	188	250E	157	250E	126	175E	94	125E	63	100E	37.5	50E	31.4	50E
10 000	252	400*	210	300E	167	250E	126	175E	84	125E	50	65E	42	65E
15 000	376	600*	314	500*	252	400*	189	250E	125	175E	76	100E	63	100E

*Use two fuse units in parallel, each having an ampere rating half of the listed ratings.

Here's an up-to-date answer:

The answer is a qualified "yes" and depends on selection of the proper fuse in the proper ampere rating and speed.

Let's examine fuse selection. Until now, for want of a better approach, the protection engineer has had to use fusing ratios or ampere rating recommendations which were arbitrarily high. Allowances had to be made for not only short-time daily overloads *(both with, and without, forced-air cooling)*, switching, and energizing transients but also for damaging of the fusible element. Moreover, extra provision had to be blindly made for short-time emergency overloading. In this way he was assured that the fuse would not blow unnecessarily. But unfortunately, the full protective range of the modern power fuse was lost.

To help the protection engineer avoid such overfusing, S&C has developed tables of Minimum Ampere Rating Recommendations* for its SMD Power Fuse (see one of four such tables below, left), each one of which is a "sharp-pencil" recommendation that provides real protection for the transformer against secondary faults, even line-to-ground.

The key to these recommendations lies in the precise significance of the term "minimum" in contrast with the customary "cover-all" use of the word. These recommendations have been pared down by tailoring them to include provisions only for transients and short-time daily overloads of the magnitudes set forth by ASA.

These minimum ampere rating recommendations expressly *exclude* allowances for short-time emergency overload, and margins for fuse damage. Here are the reasons:

1. The margin for fuse damage is obviously unnecessary with S&C silver fusible elements.
2. The short-time emergency overloading of fuses is a nonrecurring, controllable condition — such as would occur when one transformer in a duplex substation setup is temporarily out of service (thus placing all the load on the other transformer).

To enable the protection engineer to determine what degree of short-time emergency overload an SMD fuse can sustain, S&C has developed a family of "Short-Time Emergency Overload Capability Curves." These curves plot overload time in hours against overload current. The curves will show that in most applications the fuse ratings given in the Minimum Ampere Rating Recommendation tables will have adequate short-time emergency overload capability, even though allowances were not made for such overloads in the Recommendation tables. By using this special information—new to power fuses—the protection engineer can avoid revising his ampere rating selection upwards to take care of a short-time emergency overload condition that might occur only once a year. Therefore, he does not have to give up some transformer protection.

This paring down of ampere rating recommendations is done to enable the fuse to "see" faults of a much lower order than would otherwise have been possible. A fuse naturally won't pick off the lowest line-to-ground faults, but transformer protection will be greatly increased.

Write for Data Bulletin 262, "Selecting SMD Fuse Units," to S&C ELECTRIC COMPANY, 4425 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.

The ampere ratings listed in the table (left) will carry continuous loads within the nameplate rating of the transformer, or short-time daily overloads as set forth below.

Daily Overloads to Give Normal Life Expectancy

(Abstract from ASA Publication, "Guide for Loading Oil-Immersed Distribution Transformers and Power Transformers," Appendix C57.92, published January, 1956.)

Time (Hours) ↓	Times Rated Kilovolt Amperes		
	Self-Cooled and Water-Cooled Transformers		
Initial Load* (Percent) →	90	70	50
½	1.59	1.77	1.89
1	1.40	1.54	1.60
2	1.24	1.33	1.37
4	1.12	1.17	1.19
8	1.06	1.08	1.08

*Use either average load for two hours previous to load above rating or average load for 24 hours (less overload period), whichever is greater. Ambient temperature assumed is 30° C for air and 25° C for water.

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Many of your control circuit installation problems, including the cost problem, can be solved if you'll specify and use Rockbestos PNR 600 volt control cable — the cable that's been service proven over and over again through more than 14,000,000 feet of installations.

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- With it you save on conduit and fittings, cut installation costs.
- It's 46% smaller in area — 28% smaller in diameter than conventional control cable.
- It's flexible from 167° to −67°F.
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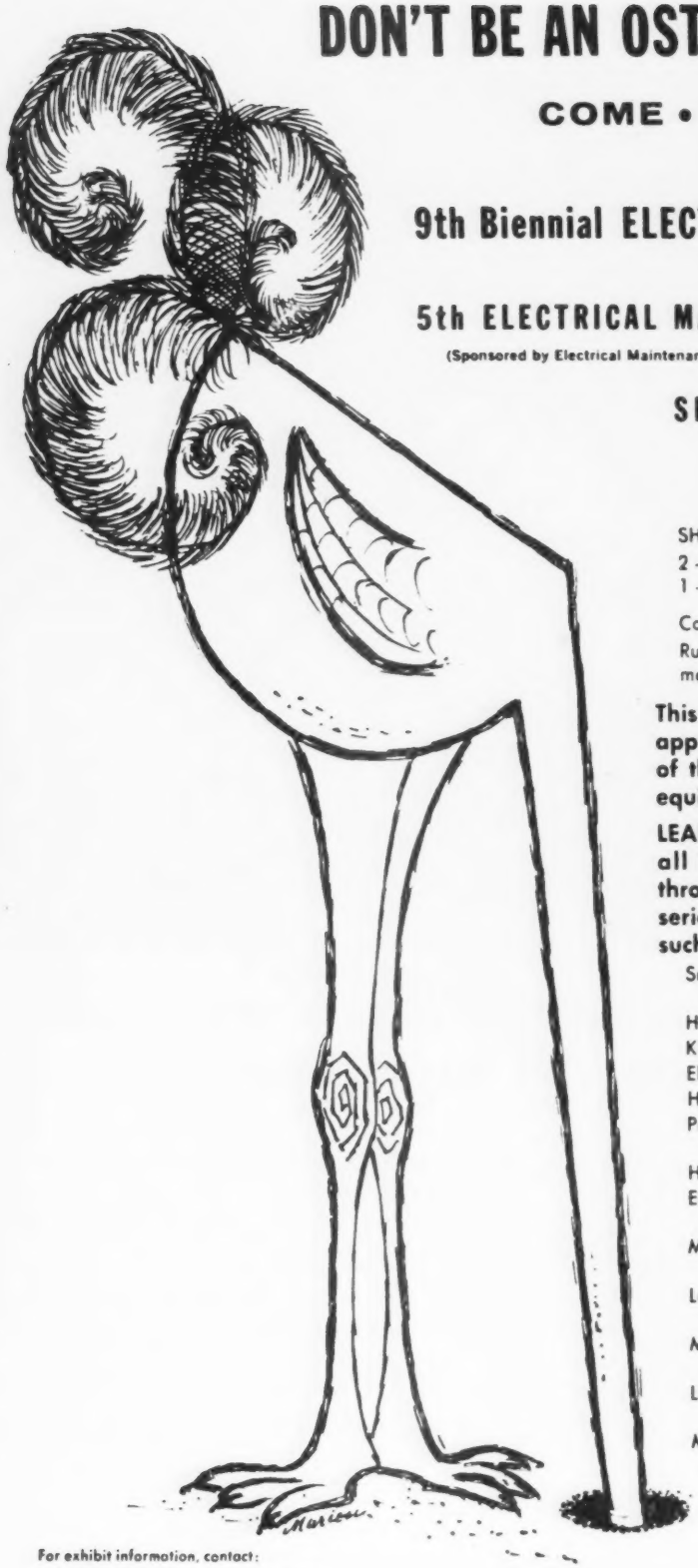
More than 14,000,000 Feet in Service

DON'T BE AN OSTRICH...



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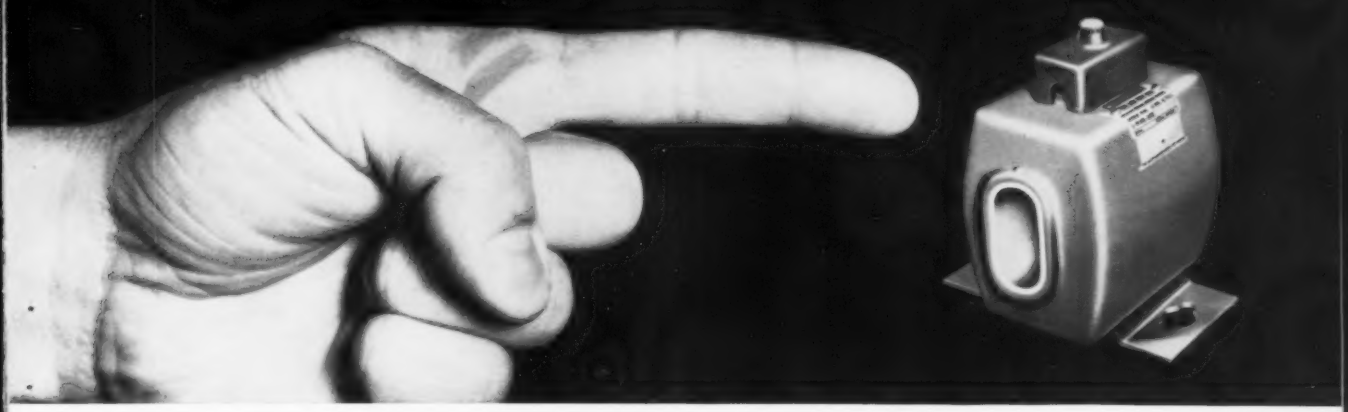
Eliminate testing

of molded current transformers

with Westinghouse

FREE CERTIFIED TEST RESULTS



you install...that's all!

Only Westinghouse gives you...

FREE CERTIFIED

You need never acceptance-test

TEST RESULTS

another molded current transformer

SAVE TIME AND MONEY . . .

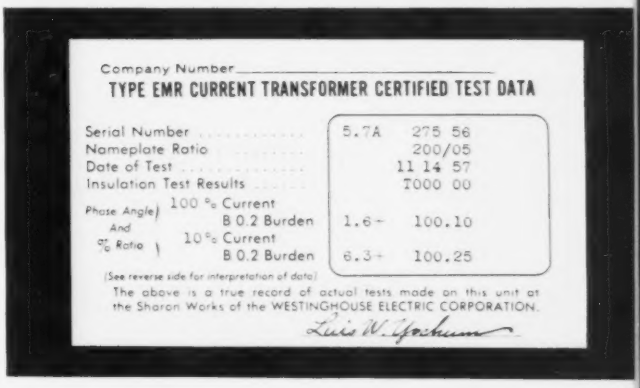
Westinghouse Certified Test Results mean that you need never *acceptance-test* another molded current transformer. This is because every Westinghouse molded current transformer is pretested *before* it is shipped. Further testing is completely eliminated . . . you install—that's all. In addition to saving time and money for you, Certified Test Results are your guarantee that when you install Westinghouse molded current transformers, you install top quality.

Westinghouse—and only Westinghouse—gives you Certified Test Results on its complete line of molded current transformers.

FOR YOUR FILES . . .

You receive for your files a 3 x 5 file card with the specific test data on every molded current transformer you purchase. This, again, eliminates another step for you when you buy Westinghouse molded current transformers.

These Certified Test Results should satisfy your state PUC requirements.



Company Number _____

TYPE EMR CURRENT TRANSFORMER CERTIFIED TEST DATA

Serial Number		5.7A	275 56
Nameplate Ratio			200/05
Date of Test			11 14 57
Insulation Test Results			T000 00
Phase Angle And % Ratio	100 % Current B 0.2 Burden	1.6+	100.10
	10 % Current B 0.2 Burden	6.3+	100.25

(See reverse side for interpretation of data)

The above is a true record of actual tests made on this unit at the Sharon Works of the WESTINGHOUSE ELECTRIC CORPORATION.

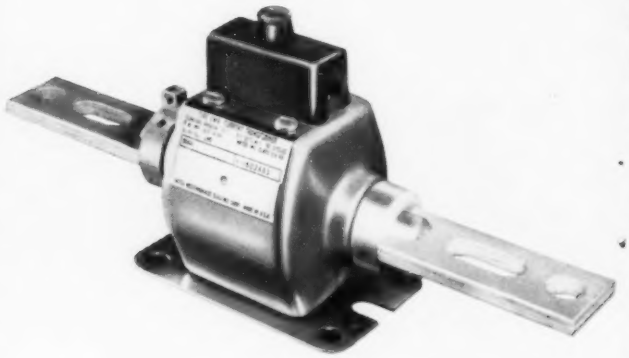
Louis W. Yochum

Molded current transformers being tested on the new Westinghouse automatic test installation at Sharon, Pennsylvania. Here is another example of Westinghouse plowing back earnings into development . . . saving you time and money by eliminating testing.

YOU CAN BE SURE... IF IT'S Westinghouse

THEY ALL HAVE IT . . .

All Westinghouse molded current transformers carry the Certified Test Results record. This includes the SM line, molded of silicone rubber, and the 600-volt class, molded of polyester elastomer, a product of Westinghouse research.



The EMO and EMR 600-volt class transformers are four ways superior to any comparable units:

- 50% greater cable capacity— with obround primary opening on the EMO.
- Positive, permanent connections— exclusive Ilsco-type secondary terminals with weatherproof covers.
- Longer life— polyester gives outstanding protection against weather and corrosive acid or alkali fumes, as well as outstanding resistance to deterioration caused by oil.
- Smaller, lighter— polyester molding, plus the new design, gives you reduced size and weight . . . simplifying installation.

REMEMBER . . .

- You eliminate all testing of these transformers when you buy Westinghouse.
- You receive specific test data about the molded current transformers you purchase from Westinghouse, at no extra cost.
- You install— that's all— when you purchase Westinghouse molded current transformers.
- You receive . . . on the EMO and EMR current transformers . . . four extra features of superiority.

For full details on Certified Test Results call your Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

JI-70833-4

YOU CAN BE SURE... IF IT'S Westinghouse

THE PEACEFUL ATOM

...takes a big step forward

Formal Dedication of the Sodium Reactor Experiment Marks Significant Milestone in Nuclear Power Program

On November 14, 1957, in a building high in California's Santa Susana Mountains, a group of people witnessed a ceremony of great significance not only to America, but to mankind everywhere. What they saw was the official confirmation of the success of the sodium graphite type of nuclear reactor as a most promising new method of increasing resources of usable power in a power-hungry world.

They were watching the formal dedication of the Sodium Reactor Experiment, designed and built for the Atomic Energy Commission by Atomics International. The SRE includes an experimental atomic power reactor, which achieved sustained nuclear fission in April, 1957. In July reactor heat was used to generate electricity. The SRE has been performing as planned, supplying data on the practical aspects of designing and operating a power station based on the Sodium Graphite Reactor. The power produced by the SRE is being delivered for use to the homes and factories of the nearby San Fernando Valley. It was the first electricity ever to be supplied to the American public by a private utility from a non-military nuclear reactor.

NUCLEAR-POWERED SPARK
A switch is thrown at the dedication of the Sodium Reactor Experiment—and electricity from the atom surges into the lines of a private utility company.

THE ATOM GOES TO WORK IN SOUTHERN CALIFORNIA
In the rugged Santa Susana Mountains near Los Angeles, the Sodium Reactor Experiment is showing great promise as a practical source of electric power.

Basis for Large Power Stations

Atomics International designed the SRE to give a maximum output of about 6500 electrical kilowatts. This nuclear power plant is now in operation as part of the Atomic Energy Commission's program to develop efficient types of reactors to meet the growing worldwide need for power. Atomics International will use data from the SRE to design and construct large power stations like the 75,000 kilowatt plant planned for the Consumers Public Power District of Nebraska.

The Southern California Edison Company cooperated with Atomics International by providing a generating plant to turn the nuclear reactor heat energy into electricity and by distributing the power to its customers.

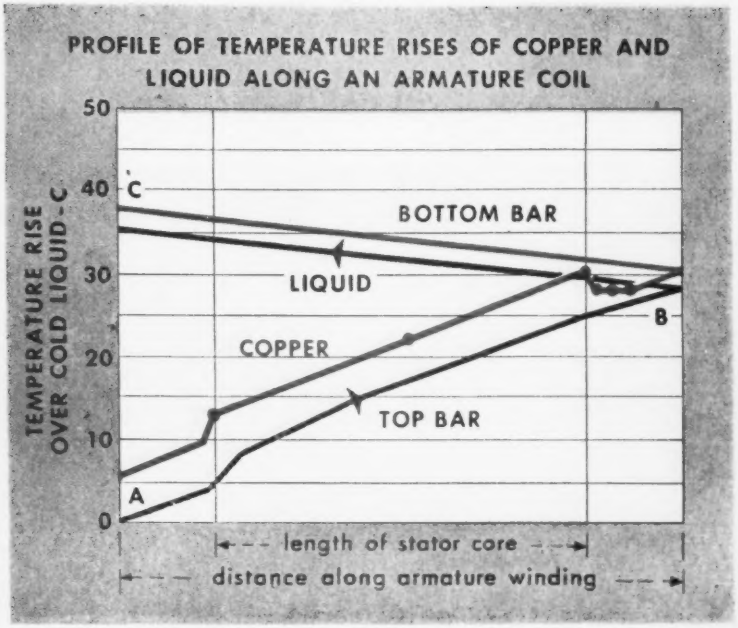
Other Achievements by AI

Another nuclear power approach being conducted by Atomics International for the Atomic Energy Commission is the Organic Moderated Reactor Experiment in Idaho, which has been operating since last September. This project will provide technical information for the construction of two 12,500 kw power stations—one in Piqua, Ohio; the other in a Latin American country. AI recently completed a study for the AEC's Maritime Reactors Branch which indicated that the OMR has technical and economic promise as a power plant for atomic supertankers and merchant ships.

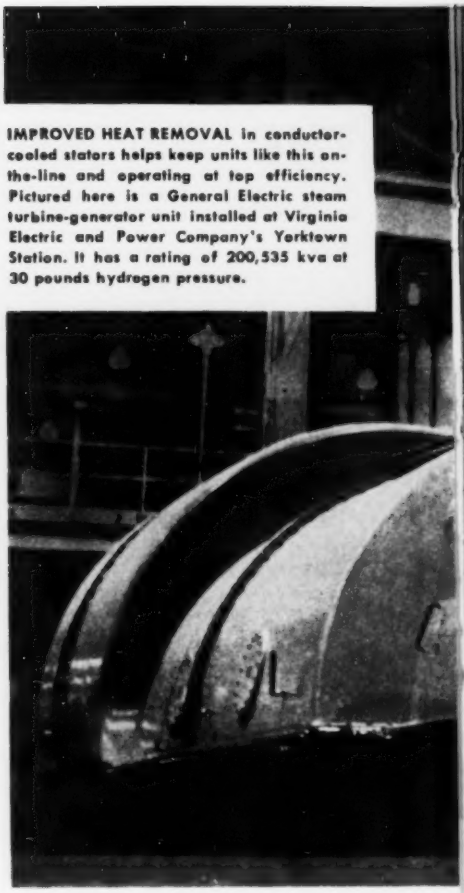
Another power reactor concept, the Advanced Epithermal Thorium Reactor, is under study for the Southwest Atomic Energy Associates. AI research reactors are now operating in Japan, Germany, Denmark, and the United States. Others are being built for Italy and West Berlin.

ATOMICS INTERNATIONAL, P.O. Box 309, Canoga Park, California. Cable Address: ATOMICS.

ATOMICS INTERNATIONAL
A DIVISION OF NORTH AMERICAN AVIATION, INC.
PIONEERS IN THE CREATIVE USE OF THE ATOM



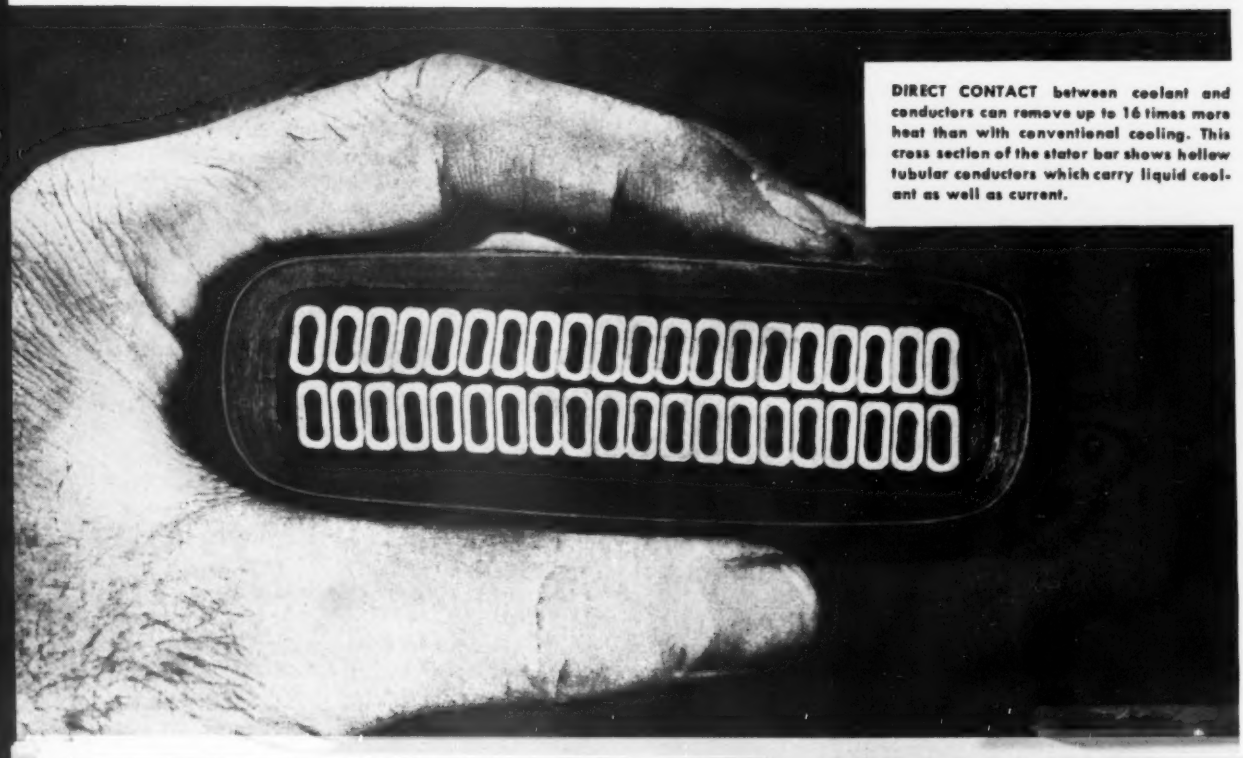
AUTOMATIC TEMPERATURE REGULATION of stator is permitted with liquid cooling. This chart shows how copper temperature remains within a few degrees of the liquid coolant.



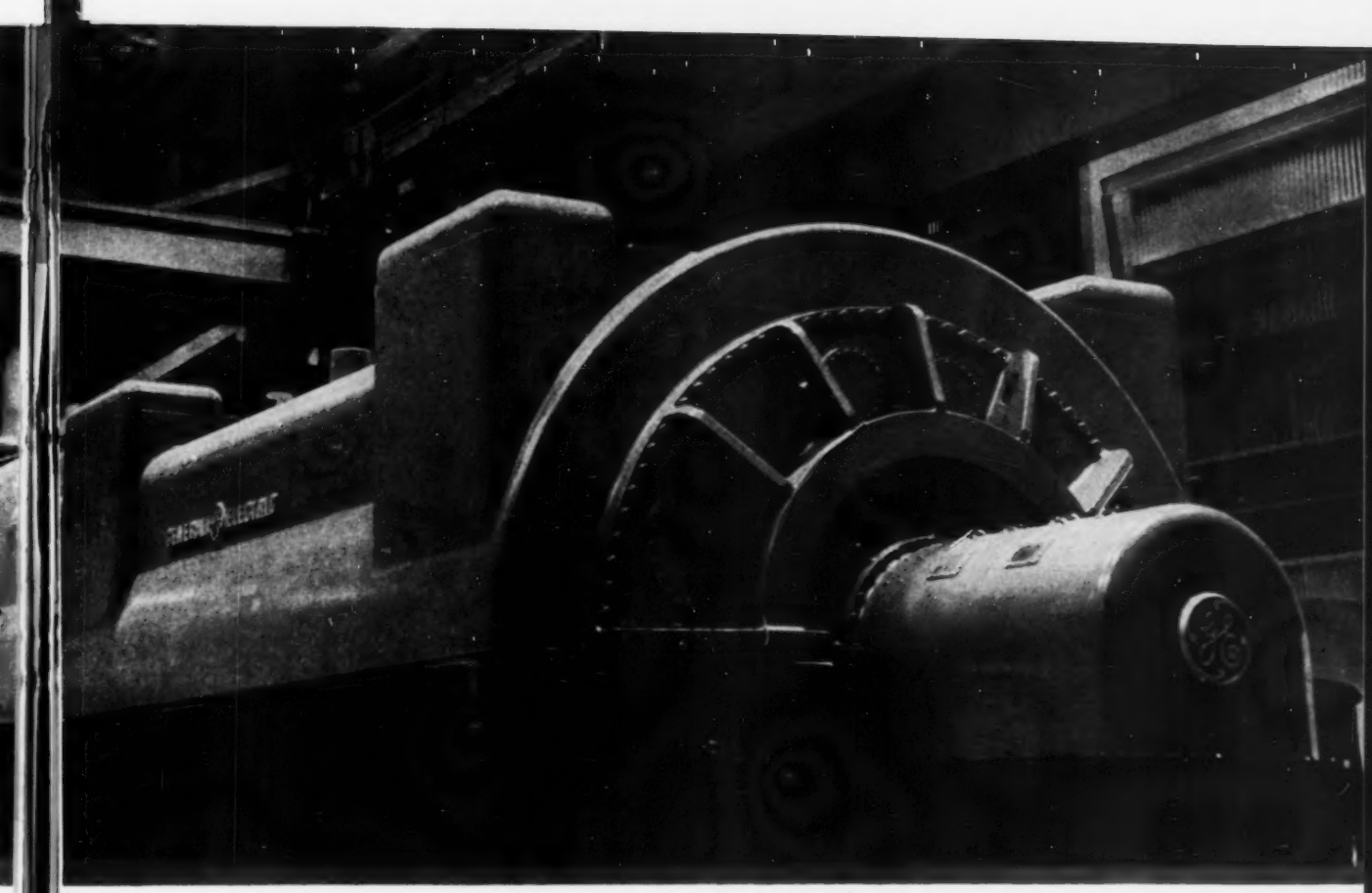
IMPROVED HEAT REMOVAL in conductor-cooled stators helps keep units like this on-the-line and operating at top efficiency. Pictured here is a General Electric steam turbine-generator unit installed at Virginia Electric and Power Company's Yorktown Station. It has a rating of 200,535 kva at 30 pounds hydrogen pressure.

WITH GENERAL ELECTRIC CONDUCTOR-COOLED GENERATOR STATORS . . .

Liquid cooling removes up to 16 times



DIRECT CONTACT between coolant and conductors can remove up to 16 times more heat than with conventional cooling. This cross section of the stator bar shows hollow tubular conductors which carry liquid coolant as well as current.



more heat, permits higher unit ratings

HOLLOW-STRAND STATOR BARS HELP IMPROVE GENERATOR PERFORMANCE

First placed in operation in 1956, liquid-conductor-cooled stators are proving to be one of the most significant advances in generator cooling since hydrogen cooling was introduced some 20 years ago.

Improved Hollow-strand stator bar construction plays an important role in liquid cooling. By providing direct contact between the cooling liquid and the copper current-carrying conductors, *up to sixteen times more heat can be removed than with conventional cooling.* The result is higher generator ratings without appreciable size increase.

Design Features such as use of Micapal insulation for improved dielectric characteristics, bar transposition for uniform temperature, high temperature brazing of liquid connections to prevent leakage, and non-corrosive characteristics of the coolant for longer life, all contribute to more dependable operation.

Improved heat removal for better generator performance is just one of many features of General Electric liquid-conductor-cooled generator stators. Other outstanding advantages are:

Design Simplicity—*Despite higher ratings made possible by liquid cooling, the dielectric system maintains the simplicity and dependability of conventionally-cooled machines.*

Reliable Performance—*Liquid cooling permits automatic regulation of temperature independent of load.*

Dependable Operation—*Closed cooling system minimizes chemical contamination and helps prevent foreign material from entering the system.*

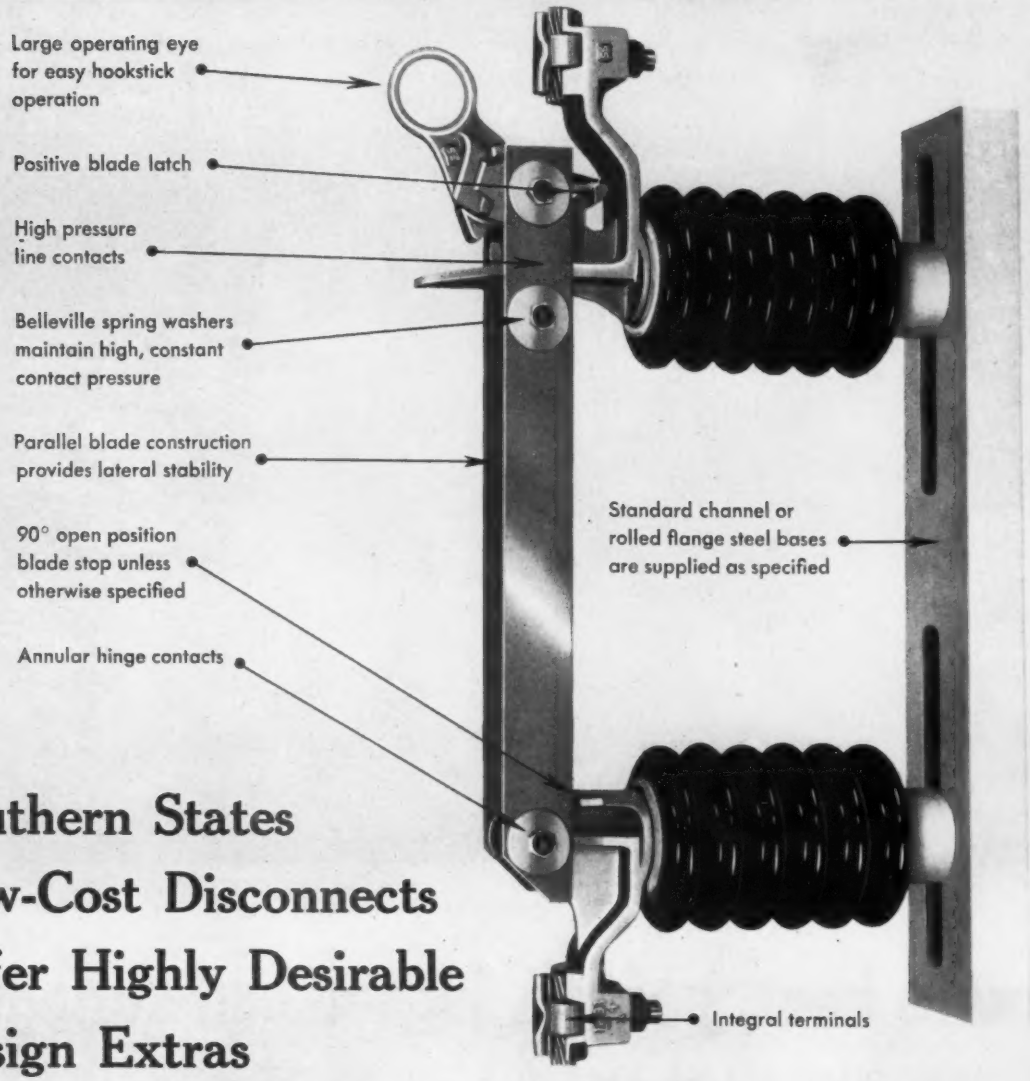
Shorter Maintenance Inspections—*Simple single-stage, low-pressure hydrogen circulating fans permit easy inspection.*

For more information on liquid cooling, write for GER-1231. Large Steam Turbine-Generator Department, General Electric Co., Schenectady 5, N. Y.

254-63

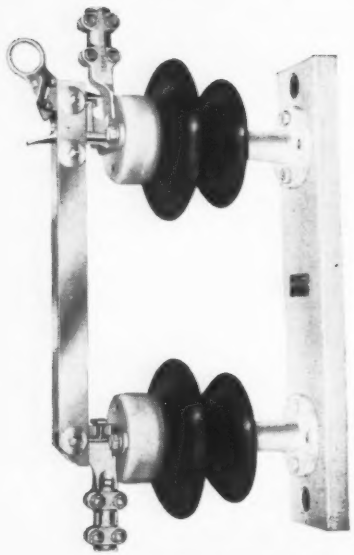
Progress Is Our Most Important Product

GENERAL ELECTRIC


Large operating eye for easy hookstick operation
Positive blade latch
High pressure line contacts
Belleville spring washers maintain high, constant contact pressure
Parallel blade construction provides lateral stability
90° open position blade stop unless otherwise specified
Annular hinge contacts
Standard channel or rolled flange steel bases are supplied as specified
Integral terminals

Southern States Low-Cost Disconnects Offer Highly Desirable Design Extras

TYPE PH



TYPE PHM

As the illustration shows, the Type PH Disconnect has many features usually found on more expensive switches. With these highly desirable design extras available on a low-cost product, it is easy to justify its use on low-revenue distribution lines for isolating, by-passing, or disconnecting.

The Type PHM, shown in the smaller illustration, has all of the features of the Type PH. The only difference is that it has NEMA Standard insulators.

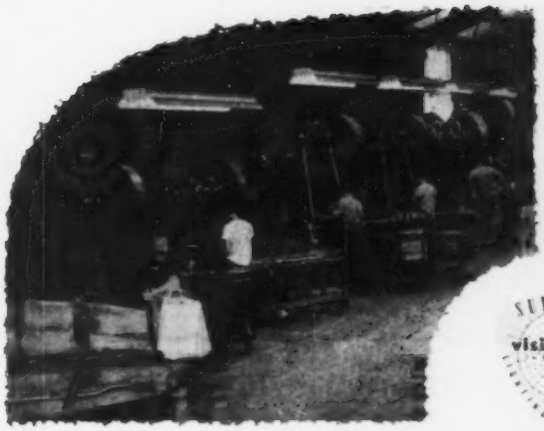
Both switches are single-throw, single-pole, hookstick operated. The PH may be mounted in vertical or underhung positions on wood crossarms. The PHM may be mounted on either steel or wood structures.

Full details will be furnished by your Southern States representative.

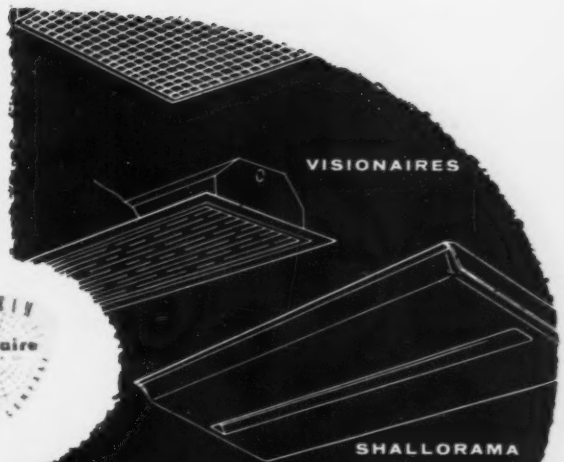
Both the PH and PHM are available in 7.5-15 kv, 200, 400, 600 amps. Also available are Southern States PHT and PHMT Tandem Transfer Switches in same ratings.

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto



Gary, Indiana



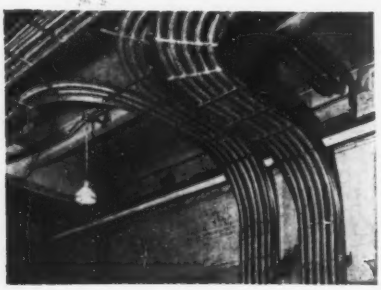
Los Angeles, California

2 COMPLETE MANUFACTURING FACILITIES TO PROMPTLY MEET YOUR LIGHTING REQUIREMENTS

Like Sunbeam Lighting's home plant in Los Angeles our new plant in Gary, Indiana has the same complete line of manufacturing facilities which have made our fixtures nationally renowned in quality. A fully automated conveyor system, electronically controlled-electrostatic spray finishing process, a multi-stage Bonderite System for cleaning, surface-treating and corrosion-proofing all metal parts—everything necessary to step-up production and delivery of our uniquely large and versatile quality fixtures across the country!

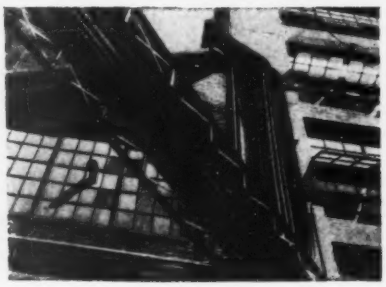
SUNBEAM LIGHTING COMPANY LOS ANGELES, CALIF., GARY, INDIANA

More convolutions per foot make National Electric



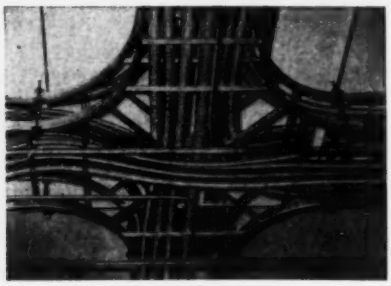
More convolutions mean greater flexibility

Bend Nepco-Lok around corners or projections indoors or out. Narrower steel strip used to make Nepco-Lok armor assures greater flexibility, speeds installation. Bondhook channel shape armor construction insures bonding and positive grounding.



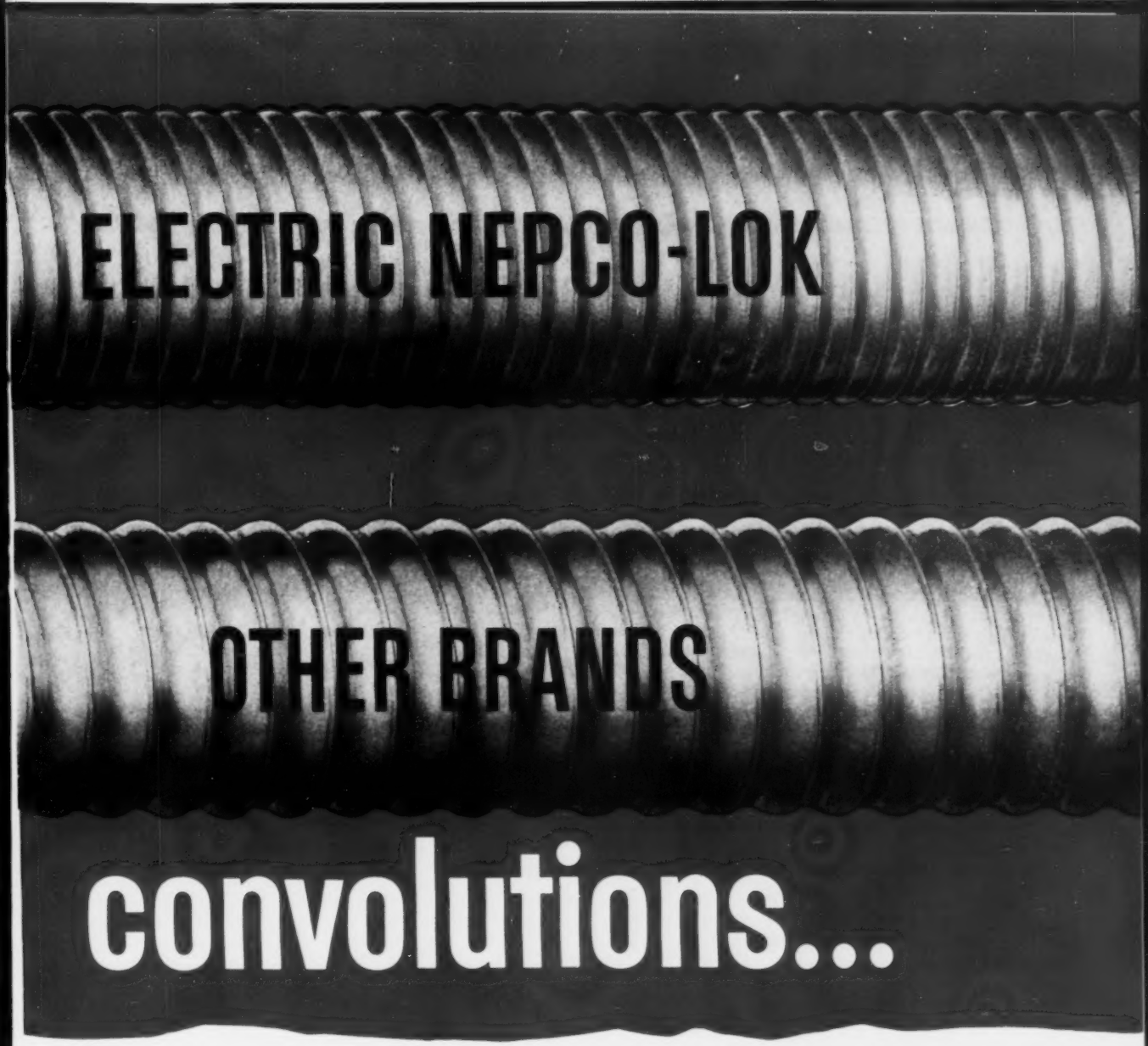
More convolutions mean fewer vertical supports

You reduce cost of vertical supports with Nepco-Lok. More convolutions mean more gripping surface for internal contact between cable and armor . . . reduces number of vertical supports needed per foot of cable.



More convolutions mean easier "pulling-in"

"Pull in" Nepco-Lok faster, easier. Reduced distance between raised convolutions provides a more uniform surface . . . reduces friction when Nepco-Lok is pulled into racks, saves installation time and cost.



Nepco-Lok the best buy in Interlocked Armor Cable

N.E. Nepco-Lok lets you get the most out of the big advantages of Interlocked Armor Cable Electrical Distribution

1. REDUCED INSTALLED COST
2. REDUCED WEIGHT
3. REDUCED SPACE REQUIREMENTS
4. REDUCED INSTALLATION TIME
5. REDUCED OUTAGE TIME

DON'T SAY ANY CABLE—SAY NE CABLE

NATIONAL ELECTRIC PRODUCTS WIRING SYSTEMS

National Electric Products

PITTSBURGH, PA.

2 Plants • 12 Warehouses • 41 Sales Offices

ELECTRA'S HUSBAND

Competition Makes Waste Motion

WE HAD just finished an excellent lunch at the club and my guest pushed back his chair slightly, lit a cigarette and sighed: "The trouble with this business is that there is too much waste motion trying to keep quality standards up to par. Take this new lighting standard that we just brought out, already there are essentially Chinese copies of it available and at a lower price. We spend the research time and effort to develop something better and then we manufacture it the best way we know how and put a fair price on it. What happens? Immediately somebody comes along and cheapens the design and cuts the price."

"That's been going on for years," I scoffed. "And you've done pretty well in building a name, reputation and, if I'm any judge of that suit you're wearing, a pretty good living out of it."

"True, true," said my friend, "but it's an uphill battle all the way and sometime I wonder if it's really worth the effort."

"Competitors are always you-know-what but somebody always has to lead the parade and you know that you wouldn't have it any other way—being out in front, I mean."

"I suppose you're right," replied my guest, "and it really wouldn't be so bad if we didn't have so many other factors in the business who are always trying to downgrade quality."

"What do you mean by that?" I asked. "You make a quality product, you have a good selling organization and I know that you're respected by the architects and engineers because your product is generally specified on the original bid when it comes out. Isn't that enough?"

"Don't be naive." My friend was beginning to get expansive. "The fight just begins when you get your product specified. We have a saying in our organization that every job has to be sold five times. That's why I said that there was too much waste motion in this business."

"Just how do you figure that?" I asked. "It seems to me that once you get your product specified the battle should be more than half won."

"That's what you think, but it just tain't so. Of course the first time you sell a job is when you get the architect or engineer to specify your particular product on the original bid. Once the job is bid in, then you have to go around to the successful bidder and sell him that the specifications are ok and should be let out to sub-contractors without any changes or the additions of 'or equal.' When you've got that far you're just about ready to really take off the gloves and start the selling job.

"Let's assume that the XYZ Contracting Co. gets the electrical subcontract. All too often he has bid the job in at an unrealistic price that doesn't take into account his full overhead, figuring that he's got to be low to get the job and he can browbeat the distributors and suppliers into knocking the equipment price down to a point that will make up the difference. If he's not successful in doing this the next move is to try to substitute less expensive units wherever possible. So you see that a real selling job has to be done on the contractor just to make sure you are not knocked out of the play entirely."

"You are making your point," I agreed, "but that's only three times you've been up to bat. What about the others?"

"Oh it gets worse and worse as we go on," grinned my guest. "Your distributor begins to get a little nervous and this grows to the point of panic in direct proportion to the toughness with which the contractor puts on the pressure. Pretty soon you begin to get phone calls from the distributor telling you that the only way he can keep the job is to get a factory price concession. So you've got to do a selling job on him to stand fast and slug it out."

"And of course you never make price concessions," I jibed.

"Well I wouldn't admit it to anybody but you, but naturally when we have to be competitive—we have to be competitive. And that brings us to the fifth time that we have to sell the job."

"I don't get it," I said. "If you finally get the contractor to take it at what so many people call an adjusted price, what else is there?"

"What's left?" asked my friend. "Why what sometimes is the hardest selling job of all and that's to sell your factory organization on taking it at the price you had to use to get the job at all. Well, that's it—count them. What waste of time, effort—and yes, money—all through. It probably could be worse but it certainly could be a lot better if everybody was a little more conscious of both quality and the sanctity of at least a minimum profit."

"How about the wasted motion among contractors?" I asked. "From what they tell me, there are from 15 to 20 bidders on every sizable job these days. A lot of lost motion there, each one making detailed estimates at considerable expense, when only one can get the job."

"Yes," sighed my friend, "that's the beginning. Then the contractor who is low has to waste more time and trouble trying to get substitutes or an 'adjusted price' from us and our distributors instead of paying attention to the job and, I might say, the customer."

"Oh well," I remarked with sarcasm, "who is he? He's not important any more. He's only the one who foots the bill. In the game of business, he's only a pawn."

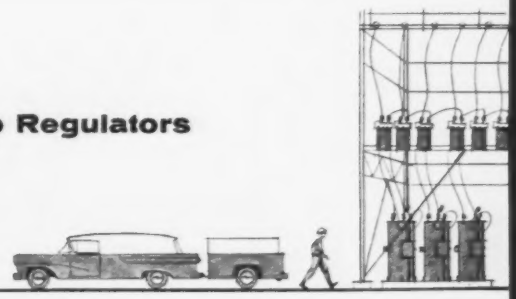
"Mighty important pawn, though," my friend emphasized. "Wouldn't be any game at all but for him."

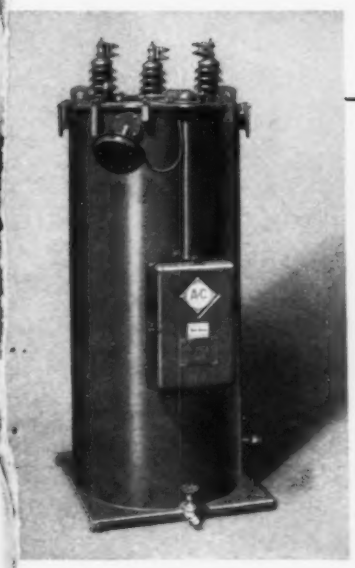
"You mean he's fair game?"

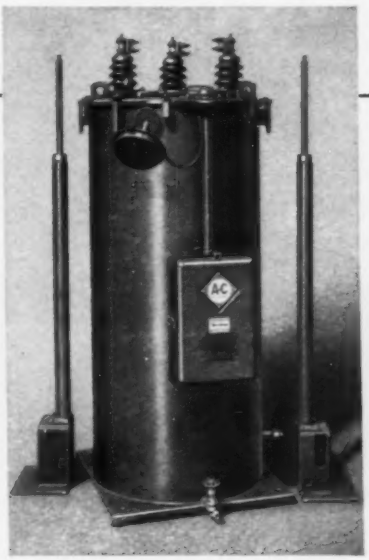
"The way this game of competition is being played these days, he's the prey, all right," he added.

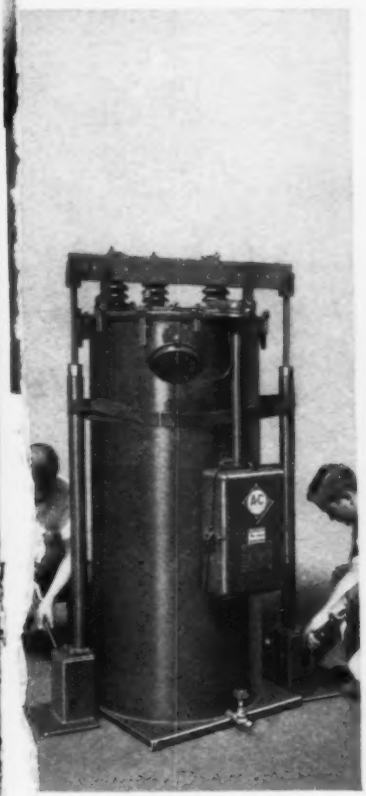
"Thanks for the business lecture," I said. "It makes this check seem almost reasonable. And somehow it makes me feel that selling advertising isn't quite as tough as I thought it was."

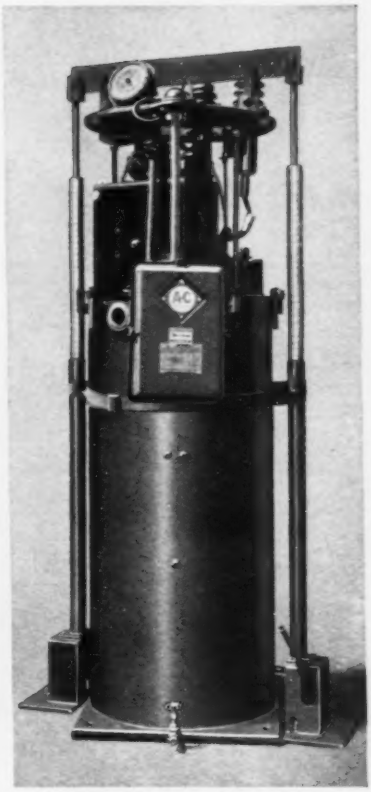
Allis-Chalmers – Originators of 5/8% Step Regulators











Get "On-the-Site" Inspection with Unit Construction

Allis-Chalmers unit construction means the transformer and tap-changing mechanism are suspended from the cover. This assures these advantages:

Easy servicing — Piecemeal inspection is eliminated by unit construction and cover suspension. There's no need to drain oil, remove bushings or control leads, or move the regulator. Field inspection is further simplified with inspection jacks which are used, as shown in photos at left, to raise mechanism high enough to permit servicing on-the-spot.

Superior workmanship — All connections during manufacturing are made out in the open before the unit is tanked. Entire operating mechanism and control can be inspected and operated while untanked.

* * *

For details of these and other advantages of Allis-Chalmers regulators, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5587

"WHY buy more

Clamp than I need?"

NEW O-B QUADRANT STRAIN CLAMP IS EXCELLENT FOR LOW-COST DEADENDS

"Why buy more clamp than I need?"

If that's your question, then the new O-B light weight Cooline LW clamp is your answer.

It's the same basic design as the heavy-duty aluminum Cooline clamp, used for many years on transmission, sub-transmission and primary distribution lines. But this new aluminum quadrant strain clamp, is lighter weight, costs less, and is designed especially for low stringing tensions.

Like the heavy-duty Cooline, the new LW clamp has a powerful snubbing action which has high holding power without crushing the conductor. The six models in the new Cooline series cover a range from .2 to 1.3 inches in conductor diameter, with ultimate strengths from 7000 to 18000 pounds. Conductor can be strung at deadends with continuous loop . . . no need to cut and splice.

Here's a clamp that is right in step with today's trends in distribution and transmission construction and in keeping with the O-B policy of offering the widest available selection of materials for deadends. Ask for this new O-B Cooline LW the next time you order strain clamps.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Six models of new O-B Cooline series cover conductor diameters from .2 to 1.3 inches.

Ohio Brass

4865-H

editorial views

Indices Still Point Up

"HOW'S business?" That's the phrase on everybody's lips today. Measured by standards set the first quarter of last year, it is not particularly good. Measured by performance in the same period two or three years ago, it's pretty fair. Statistical optimists still outnumber the pessimists by a considerable margin. The former base their predictions that the decline will be reversed by midyear on the strength of three or four key props to the economy. The first of these is the inventory liquidation, which has been considerable and in excess of buying. That means new orders will have to appear soon. The second is the spurt of defense spending that is on the way up—insofar as orders placed is concerned but which will not be felt, economically, for many months. The third is capital spending which, according to the Department of Commerce, will be 5% above the total for 1957 and just under $50 billion for this year. The fourth is consumer buying (dependent upon consumer income) and consumer income will rise in 1958 despite a current unemployment figure of around 4,000,000. This rise is anticipated because the combination of wage increases and compensation payments during the year is expected to raise the total personal income to the $347 billion figure.

Now these figures all look very promising. They do not mean that a return to boom times will come automatically if everybody just sits around, grouses about business and waits for a shift in buyer attitude. All they do indicate is that the business climate is right to make things happen.

Prospects for the electrical industry seem particularly good for an early upswing. A survey by Engineering News-Record of architects and engineers reveals that projects on the drawing boards are 22% ahead of a year ago. Electric utility construction shows no sign of a stretch-out on the record-breaking budget for 1958. The executive manager of the U. S. Savings & Loan League forecasts that the housing industry would see a 10% increase in 1958 because of more mortgage funds being available. All these things portend that 1958 will be a good year businesswise—if we don't talk ourselves out of it.

New Focus

THE domestic customer, after a long period of being obscured by mushrooming industrial growth, is coming back into focus. While domestic load growth in the past decade has not been neglected, neither has it been pursued as aggressively as it should have been. As a result, this important category of electric consumption has not moved ahead at the pace it should have.

Since the war, appliance distribution passed through the cycle of scarcity into a condition of price demoralization. Discounting became a substitute for selling; big volume discount houses drove many of the smaller independent retailers either out of business completely or into other lines which have diluted their selling effort. Utilities, faced with load growths that taxed their construction capabilities, were inclined to ease off on load promotion in all categories. The situation certainly has been different than it was in the freewheeling, prewar selling program with its door-to-door canvassing, hard-hitting merchandising promotions and highly organized sales departments. Memories of the great depression of the early 30s were too recent and the part that the domestic load played in buttressing profit and loss statements was too highly respected.

Only a few of the most confirmed pessimists believe that even a mild recession is in store. On the other hand, 1958 will

be a year of strong national promotions aimed at better living electrically. It seems to be a most opportune time to make the investments necessary to get the domestic load up to average consumptions that will give the customer the full benefit of the services the industry has to offer. It means more selling and harder selling at the customer level. And it will pay dividends both monetary and in better customer relations.

The Practical Approach

THERE may be some raised eyebrows for our article on page 71 regarding the use of foreign cars in a utility fleet operation. If so, it should be clearly pointed out that there is a big difference between a utility company's using foreign automobiles and buying foreign generators or transformers. There is a broad difference between saving the free world and protecting some vital American industries. Perhaps it's time that our industry should clarify its thinking on this point so as to achieve a unified, reasonable and defensible stand on the subject of imports.

Recently, the Committee for Economic Development asked 50 eminent economists, businessmen and politicians this question: "What is the most important economic problem facing the United States in the next 20 years?" Two-thirds of the group replied: "How to up-date American policy on tariffs and foreign aid."

It would seem that, if the U. S. is faced with a decision between giving money away or doing business abroad, the healthiest solution is to do business abroad—but on its own terms and within its own best interests. This, in effect, means that foreign trade items ought to be in areas that would pit our automated factories against the low-wage advantage of European producers.

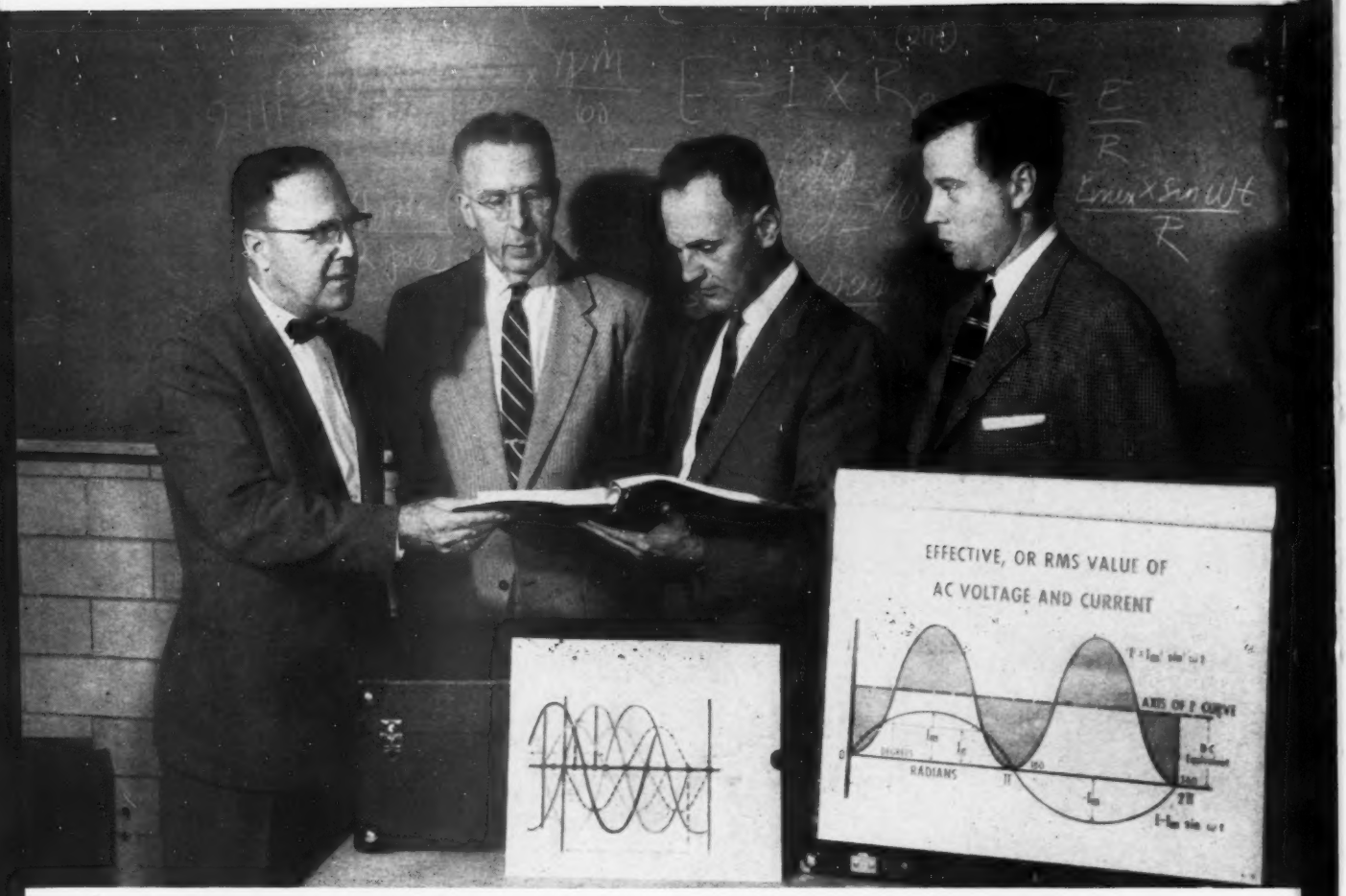
If foreign trade channels must be widened, they should be widened in areas where the American genius for mass production can be brought into play. It's far easier to automate a truck line, for example, than it is to automate turbine or power transformer production. And even successful foreign competition in our mass-production industries does not have nearly the impact on national defense and the over-all economy as it does in heavy industry where a large component of highly skilled labor is indispensable.

If our overseas friends have to have dollars, let them be generated by arranging tariffs that will permit sales of foreign goods and products that will compete with our mass-produced equivalents and discourage competition with our smaller but vital heavy industries.

IN MY OPINION, 1958 will be a year free Americans act as they always have responded in their greatest hours—confronting trouble with unflinching nerve, accepting challenge with an iron will to win, and—depsite many obstacles and some setbacks—mastering their problems with brains, work and backbone.

I foresee, so to speak, an outpouring of this deep, historic spirit by government and people. It not only will advance security and peace but also give the economy a forward shove.

Among plus factors in evidence are stepped-up defense orders, history's greatest highway project moving faster from blueprint to construction stage, continued population growth and private spending, reflecting confidence.—Sinclair Weeks, Secretary of Commerce.



NEWEST GENERAL ELECTRIC TRAINING COURSE in polyphase metering was conducted recently at Rochester Gas & Electric Corp., Rochester, N. Y. Reviewing some of the material which was presented to 16 RG&E employees are, l. to r., F. W. Sullivan, Supt., Electric Meters and Test Dept.; H. A. Brown, Supt., Electric Distribution; P. S. Jennings, G-E Meter Specialist who conducted the course; V. B. Stoll, G-E Sales Engineer.

How General Electric courses bring "added value" to electric utilities

Newest training course incorporates research data

The end product of research at General Electric is new, improved apparatus, but the intermediate product of research—the accumulation of product and system data—can be equally important to electric utilities. For this information contains the basis of better understanding not only of a product but also its relationship to the entire system.

General Electric's new polyphase meter training course is the latest example of how product value is implemented by making extensive research information available to utilities. The polyphase course is planned for presentation in five sections, up to 40 hours, and local General Electric Apparatus Sales Offices will arrange the schedule to fit utilities' convenience.

General Electric has offered the following classes and courses. They indicate the range and scope of the added value information which is available to make your General Electric apparatus a more valuable investment. Your local G-E Apparatus Office will give you complete details. General Electric Company, Schenectady 5, New York.

POWER SYSTEMS ENGINEERING COURSE—28-week program of advanced study—work assignments, factory inspections, lectures—sponsored by G.E. in Schenectady. Engineers selected for the course have 3–7 years' experience with a power company, consulting firm or university. Sponsoring companies assume salary, traveling and living expenses while G.E. assumes instruction and related costs..

DIGITAL COMPUTER COURSE discusses what problems in utility system design and operation can be solved with aid of digital computers. 4-week course gives practical, workshop experience to system planning personnel.

ENGINEERING PLANNING CONFERENCES for decision-making utility personnel are conducted in distribution and relaying. They provide opportunity for a mutual exchange of problems and latest information in these fields. 3-day conferences are held in Schenectady and Hudson Falls, N. Y., and Pittsfield, Mass., on distribution; Philadelphia for relaying.

OUTDOOR LIGHTING INSTITUTES are held on a scheduled basis at Hendersonville, N. C. The three-day course covers the technical aspects of street and highway lighting system design.

ELECTRIC UTILITY SYSTEMS AND PRACTICES is a workbook—a basic primer—written originally for General Electric personnel. It has since been mailed to 1600 people entering the industry in the past three years and is offered to utilities at $3 per copy.

LIVE BETTER ELECTRICALLY

301-375

MORE POWER TO AMERICA

GENERAL ELECTRIC

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U.S. VOL. 120 NO. 3 MARCH 1958

The bigger job you get, the tougher the problem of . . .

Finding Out What's Going On

Dr. Joseph G. Phelan, Ph.D.
Industrial Psychologist, Bechtel Corp.

Problems of Management—III

Decision making is the key job of a supervisor. Correct decisions can only be based on a knowledge of the facts, situations and "angles." He gets this information from subordinates, other supervisors, and – too often or too late – from the grapevine.

To become a successful information-getter, it is important that the supervisor must understand the natural barriers to communication. Some of these are:

1. Differences in the positions of employee and supervisor makes a subordinate feel less free to express himself. He doesn't talk freely as he does with other people. Oftentimes, he reads meanings into the supervisor's remarks.

2. Employees are particularly sensitive to the power of the supervisor to reward or punish, depending on the information that is exposed. Because the boss has the whip-hand employees are often inclined to oversell. All this, in a sincere effort to impress the supervisor, may lead the supervisor down the primrose path.

3. In like manner, the employee is not anxious to advance information that will put one of his associates in a bad light.

A technique has been developed, called "understanding-listening" which will enable supervisors to get the unvarnished truth.

For many supervisors the technique is difficult to put into play because of their normal habit of "taking over" an interview and concentrating on getting *their* ideas across. The emotional atmosphere of the "understanding-listening" interview is one of interest, understanding and respect for the subordinate's ideas. This cuts down the psychological distance between a supervisor and a subordinate and, in an atmosphere of understanding and tolerance, the true facts come out. Before you can apply understanding-listening it is necessary to agree on two ground rules:

1. You must have a real desire to understand the person, the situation and the relationship between the person and the situation.

2. You must be sensitive not only to what is being said but also to the feelings, attitudes and motives reflected by what is being said.

The tendency is to take what others say as an objective statement of facts, but most people don't say exactly what they mean—either because they don't want to, or because they use words that convey different meanings to you. If the person being interviewed is allowed to expand his remarks, his true feelings will start to come through.

Here are some techniques that will help keep an understanding-listening interview rolling:

1. Respond with good mood and manner—a nod, a smile, a listening pause.

2. Try brief, neutral responses . . . "I see," "I understand," "That must have been interesting."

3. Keep the interview going by repeating the employee's closing remark as a question.

4. Don't direct the employee's thinking by asking direct questions. Encourage expression rather than a yes or no answer. Instead of "Do you like working with night people?" say "How do you feel about working with night people?"

Developing skill in understanding-listening is difficult but rewarding. To measure your progress, outline the discussion following a practice interview. Then, in the margin, jot down your understanding of the feelings and attitudes *behind* the actual words.

Analyze your response in terms of questions such as these:

Did my response show that I was aware of the total contents—motives, attitudes, etc.?

Was my response appropriate, neutral, understanding?

Did my response encourage further expression without changing the course of the conversation?

Finally, check the interview as a whole to see if your objective of a complete understanding was attained. If not, find out where the conversation went off the track.

In practice, every interview is made up of getting and giving information. The supervisor *must* listen and understand until his comprehension of the true problem and all the side problems is sufficient to allow him to determine a sound course of action. The supervisor then "takes over" to explain his viewpoint and announce a course of action. But the interview isn't over then – the supervisor then applies understanding-listening once more to evaluate the effectiveness and acceptance of the action.

Successful understanding-listening depends on a real desire to understand and to feel the meanings behind the actual words. With a little practice, the necessary skill can be developed.

Check Your Score on Test, Page 13

All the answers are false except 3 and 6.

Profit Plan for Electrical Wholesalers

Leonard P. Shelley, Vice-President and Western Regional Manager, Federal Pacific Electric Co.

RECENTLY I was reading in a sales magazine an article entitled "Are Distributor Discounts Too Low?" It pointed out something that every electrical wholesaler knows, namely, that income in the electrical wholesale business is pretty much a fixed percentage, while operating costs continue to rise.

It was the intent of that article to point out to every wholesaler, whose opinion is that distributor discounts are too low, that he must begin to analyze his costs by product line if he is to be successful in obtaining a larger discount from manufacturers. As the article points out, it is conceivable that some product lines that yield 33% gross profit might actually be extremely expensive to sell with a sales cost exceeding 33%, which means that it is an unprofitable product line.

As I read that article, I naturally related it to our electrical wholesalers. I wondered how many wholesalers in the electrical industry have analyzed their product lines for profit yield. I am certain that many of the more astute wholesalers have, and are therefore concentrating on the sale of product lines that produce the greatest yield. If this study of profit yield on product lines was undertaken by each and every electrical wholesaler, it is my opinion that the complexion of the electrical wholesaling business would change overnight.

Notwithstanding anything that has been said to the contrary, the electrical manufacturers need the electrical wholesaler as a vital link in the chain of distribution and, therefore, the manufacturer is vitally interested from a business point of view in seeing to it that the electrical wholesaling industry continues to make progress. The simple fact of the matter is that an electrical wholesaler can market products at a lower cost and more efficiently than the electrical manufacturer himself.

The three primary functions of the wholesaler are: (1) to have merchandise readily available in inventory when called for by the customers; (2) to arrange for collection and credit matters; and (3) to provide service to those customers. These functions provide the manufacturer mass distribution by dealing with one customer who sells to a large number of smaller customers.

In a market where operating costs are increasing, it is a natural turn of events for the wholesaler to elect to discontinue performing any one of the functions for which he is responsible. This obviously lowers his cost, but such an action can, in the final analysis, only create greater problems for the wholesaler and, therefore, should be avoided. Wholesalers are continually reducing their inventories, particularly in metropolitan areas, and are depending in a great measure on the manufacturer's inventory to supply the daily needs of their sales organizations. This, in turn, because it lowers the operating costs of the wholesaler, leads the more gullible wholesaler into believing that, his operating costs being lower, he can sell for less. As is the general practice today, wholesalers are giving away larger and larger portions of their discount. The manufacturer, on the other hand, observing all of this action, sees that one by one the services of the electrical wholesaler are being dropped. The manufacturer, therefore, has to pick up the service functions thus dropped and raises his prices accordingly.

When one examines this situation critically, it is pretty safe to say all that has happened is that the actual discount of the electrical wholesaler is considerably below the discount that the manufacturer intended to allow the wholesaler. Should this situation continue, instead of the wholesaler getting larger discounts he will wind up getting smaller discounts because the manufacturer will be performing services heretofore performed by the wholesaler.

An article written some time ago by a wholesaler who was well versed in the panelboard and switchboard market pointed out this is exactly the situation that prevails today in the sale of those electrical products. Despite efforts by wholesalers in general, and this wholesaler in particular, to reverse this trend, it is so well established that it is questionable in my mind if this class of electrical products will long continue to be marketed by the electrical wholesaler. Many intelligent, well managed electrical wholesalers believe this class of electrical products will eventually be sold directly by the manufacturer to the electrical contractor without the wholesaler being involved. I concur in that belief and, further, it is my opinion that lighting fixtures will follow this trend and will eventually be sold directly to the ultimate consumer by the manufacturer.

Those of us in the electrical business who earn our livelihood directly or indirectly through the wholesaling of electrical products had better give some serious consideration to the type of wholesaling business we expect to have in the future, or circumstances will decide it for us. If circumstances decide it for us, the complexion of the business will be anything but what most of the wholesalers want it to be. If, on the other hand, a large group of wholesalers decide on a unified course of action, the complexion of the business will be pretty much what they want it to be. If a study of the electrical wholesaling business by product lines reveals that costs on a specific line are equal to or greater than the allowable discount, the manufacturer will have little recourse but to extend larger discounts.

To summarize, every electrical wholesaler determined to stay in business must (1) decide the type of business he wishes to run in the future and begin planning accordingly; (2) recognize the value of the service he performs as a wholesaler and insist on being reimbursed for such service; (3) point out to manufacturers the importance of such services as they relate to good distribution; (4) sell his customers on the necessity of those services, and this will substantially offset the cut prices offered by wholesalers who do not perform those services; (5) make every effort to avoid dropping services which justify the very existence of the electrical wholesaler; (6) begin studies to expose the cost of doing business, thereby having factual information on profit; and (7) undertake to determine the profit yield on the key items or lines handled.

Principals at press conference announcing that Pacific Gas and Electric Co. would build a 60,000-kw atomic power station: Arthur Bragg, G-E, far left; W. Dreyer, PG and E chief engineer; N. R. Sutherland, PG and E president; C. C. Whelchel, PG and E, Perry Yates, Bechtel Corp., at far right

PG and E takes long stride toward competitive nuclear power in announcing a . . .

New 60,000-Kw, 8-Mill/Kwh Atomic Plant

An impressive break-through on the economics of atomic power that may move the electrical industry years ahead in the development of large-scale commercial atom-power can be credited to Pacific Gas and Electric Co. On Feb. 19, PG and E's President Norman R. Sutherland telegraphed Admiral Lewis Strauss that his company was prepar d to build a 60,000-kw nuclear p wer station on its present Humboldt ay plant site near Eureka, Calif. The goal of the new plant is 8 mills per kwh electrical energy.

Impressive also is the fact that the new station, which will be built on a firm price, "turn-key" contract with the Bechtel Corp., will be financed entirely with PG and E funds and without assistance from the Atomic Energy Commission for research and development. This big step forward may be partly credited to the fact that the purchaser, engineer-builder, and equipment supplier have returned to their normal roles. No longer is the reactor builder shackled with project responsibility, a stipulation that has required costly engineering review and coordination.

Station Details

The atomic unit, which will be of the boiling-water type having a normal rating of 165,000 thermal kw, incorporates design features gained from the successful operation of PG and E's first atomic power station at Vallecitos, which it co-sponsored with General Electric. Steam condition will be the same as Vallecitos, 1,000 lb, 545 F. Experience gained there has enabled the construction of a new and larger reactor with economies that give promise of materially reduced energy costs.

The nuclear thermal unit is of interest because it will provide for complete internal steam separation and dryers, and will have the largest steam flow using the single-cycle principle. Engineers point out that the dual cycle was dropped to hold costs in check, but that on a larger station—say 200,000 kw—a dual cycle would pay off. It will also be the largest reactor to date with natural circulation and it will incorporate advanced designs for fuel handling and refueling. Target date for completion of the station is mid-1962.

New Atomic Economics

The economic story is one of the low fuel cost, offsetting a large capital investment.

	Capital Cost
Conventional plant	$11,000,000
Atomic plant	$20,000,000

Even this capital cost is remarkable. The station will have twelve times Vallecitos' capacity, but only twice the area requirement.

The value of the uranium in a charge is $5,000,000, which the government will rent for 4%, or $200,000/yr. Fuel fabrication will cost $3,000,000. Core life is estimated at three—possibly four—years. Based on a 90% load factor:

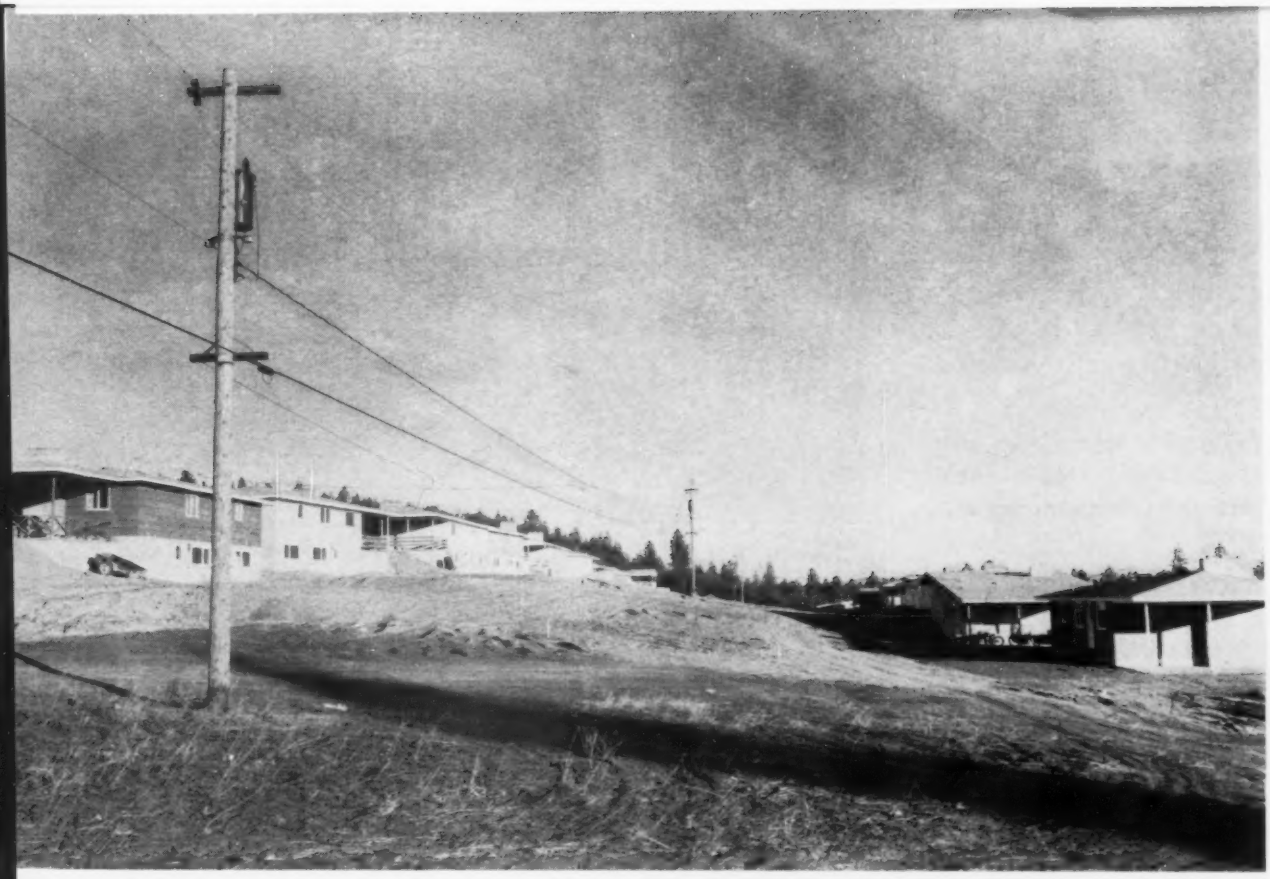
	Annual Fuel Cost
Conventional plant	$2,350,000
Atomic plant	$1,040,000

Additional cost of insurance attributed to the atomic nature of the addition is $250,000/yr.

Eureka is a moderately high fuel cost area and this, coupled with the advanced design of the reactor, combines to achieve a competitive commercial electrical energy figure that will approach 8 mills/kwh with the first core and achieve that figure with the second core. General Electric Co. will provide the nuclear and electrical equipment and will fabricate the fuel elements (Dresden type) under a separate contract.

Four Steps

According to Sutherland, the Humboldt Bay atomic station is the fourth step in PG and E's efforts to provide low-cost atomic energy for California customers. The first three steps consisted of participation in initial study groups, the construction of the Vallecitos atomic plant, and participation in the Nuclear Power Group Inc., which is building the 180,000-kw Dresden atomic station near Chicago. The fifth step already is under way as PG and E engineers continue to work on reducing the capital cost of a 200,000-kw atomic station that the company desires to build when the energy cost goals for the Humboldt unit are achieved.



Washington Water Power's approach shows extra long spans, midspan service takeoff, obvious absence of secondaries

Designing for high use customers, WWP engineers scuttle secondaries and . . .

Simplify Residential Construction

WWP engineers took an appraising look at the distribution construction in residential areas where customer usage ranged from 8,000 to 10,000 kwh per year. A close look at the construction that had "growed" over the years showed conventional crossarm construction with spans of 150-180 ft and a 37½-kva transformer on every other pole. This resulted in the use of only a fraction of the secondary being used. They asked themselves, "Why have any secondary at all?"

The resulting construction shows the obvious advantage of the fresh approach. Spans were lengthened to 360 ft and linked on the primary by a phase wire and high strength neutral. Without secondaries, triplex services were run direct from the pole to a mast on the customer's house. Where a home is not accessible from the transformer pole, the triplex is run along the neutral until in the clear.

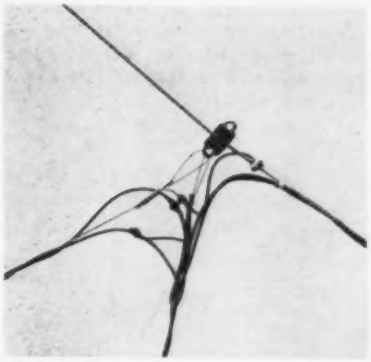
Easy to Service

In some areas, this makes possible rear lot line service with poles and large transformers located in the parkway on opposite streets. The primary spans the whole block. This approach gives easy accessibility to the poles and transformers, reducing the cost of installation, maintenance and tree trimming. With fewer poles and crossarms, customer acceptance is good.

Customers and line crews both like the fact that, with fewer poles, there is less chance that service crews will be forced to make change-outs and repairs on a pole in someone's prized garden. Outages, which are most common at nights or during bad weather, can be more quickly repaired because service trucks can drive right up to the power poles. Customers will like that too.

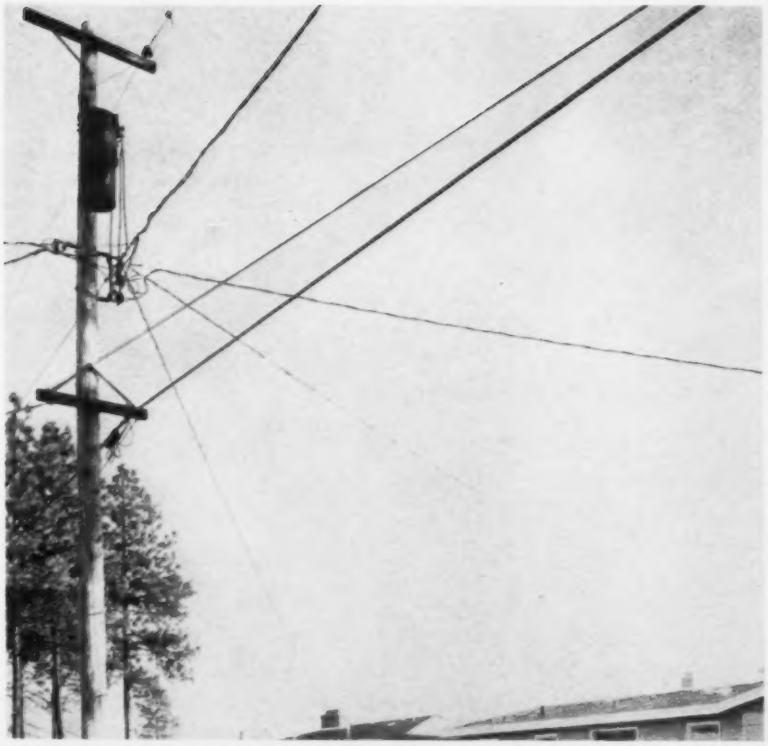
Cuts Capital Costs

George Brunzell, Washington Water Power's executive vice-president, said: "We had a hunch that a design specifically aimed at our high-use customers would have economic as well as operating advantages.



Close-up details triplex service drop

The new approach indicates reduced capital costs of about one-third with some increase in transformer capacity. Viewed objectively, omitting the secondary leaves just one less thing to install and maintain. WWP's approach has not seen the years of service necessary to become "standard." However, any scheme which makes a one-third reduction in capital investment and appears to promise savings in operating and maintenance, serves high-use customers, deserves the careful attention of the industry.



Normal installation has service drop direct from the power pole to the house

Power Flows As Tarp Seals Power House

At The Dalles Dam several generators are in operation and others are in various stages of assembly.

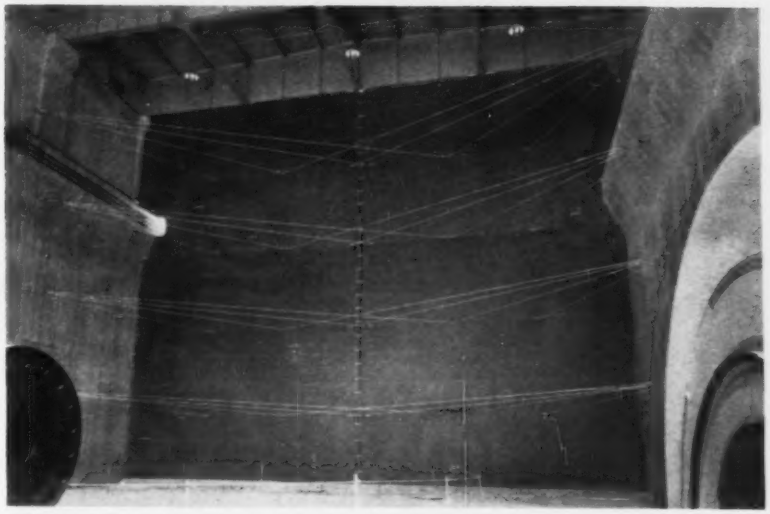
Meanwhile, construction of the power house walls and roof is still under way so that one end of the power house is open to the elements, and will be until the summer of 1958.

Without some means of closure, frost accumulation, condensed moisture and blowing dust would damage operating generators as well as those still under construction.

Moreover, because some phases of general construction cannot proceed at low temperatures, zero weather, such as occurred last winter at The Dalles, would cause delays in generator construction and result in substantial loss of power revenue.

To cover this 60x80-ft opening by any type of rigid construction would have involved substantial and expensive structural members to withstand the wind pressure anticipated.

It was determined that a large tarpaulin would do the job if a non-shrink material of sufficient strength could be found that would also be fire-resistant, and provided that the tarpaulin could be kept from flapping excessively during periods of strong wind.



Well-braced tarp stems weather as units 1 and 2 operate, others are completed

The material finally selected was vinyl-coated nylon having a tensile strength of over 200 lb a lineal inch and virtually tear-proof. To facilitate fabrication and installation, the curtain was designed to consist of two halves laced together vertically at the center of the power house with the joint covered by a "weather-flap."

Cost of the installation to the government was about $6,000, but a recovery of perhaps $1,000 is expected to be realized for materials salvaged. The $5,000 net cost is less than one-fourth the estimated cost for an equivalent closure constructed of rigid materials.

In free flight, with pole suspended from below, the chopper heads for hole site (right) where, with the aid of ground crews, the pole is set, back-filled and the crews evacuated

Southern Cal Edison, PG and E try whirlybirds for pole setting and line stringing to see if . . .

'Copters Chop Construction Costs

A helicopter beat its way back and forth over rugged Le Cumbre Peak north of Santa Barbara, airlifting fully equipped power poles into position to bring electricity to the Civil Aeronautics Authority's microwave repeater station.

The giant whirlybird, a Sikorsky S-58, made 45 runs for Southern California Edison Co., each time dangling a 40-ft pole complete with crossarms and insulators beneath it and carefully lowering it into a hole dug along the route of the 16,000-v power line.

10 Days Work in 1

Edison officials called the operation "highly successful." They estimate that using the helicopter saved at least nine working days in completing the line.

"With the 'copter, we were able to do in one day what it would have taken ground crews 10 days to accomplish," a spokesman said.

The power line will extend about four miles—all in rough mountain terrain—to the 3,300-ft-high summit of Le Cumbre Peak. Holes for the poles were dug in advance by ground crews at intervals of approximately 500 ft.

Final phase of the operation was stringing aluminum conductor for the power line. Part of this was done from the air, with the helicopter resembling a huge spider spinning a web. The pilot maneuvers his craft over the route of the line, reeling out line as he goes and draping it over the crossarms of each pole. Ground forces then complete installation and put the line into service.

Variety of Uses

The Edison company, it was noted, has been experimenting with several novel uses of helicopters. For example, the company recently airlifted bulky steel and equipment for construction of transmission towers near Santa Paula (ELECTRICAL WEST, December 1957, p 82) and, last winter, transported teams of hydrographers into remote areas of the High Sierra to make snow surveys. 'Copters also have been used

by the company for several years to patrol transmission lines.

PG and E Reports

In almost inaccessible land in Los Padres National Forest, both pole setting and wire stringing for a new three-mile line was done by helicopters.

Operating at elevations ranging up to 4,300 ft, a 12-passenger Sikorsky placed 59 wooden poles, one at a time, in holes dug by ground crews, brought in earlier by a two-passenger Bell helicopter.

After the pole holes were filled and tamped by the same ground crews that had dug them, the two-passenger helicopter made a series of passes over the crossarms of the poles laying out the three strands of wire. Wires were attached manually to the insulators.

The line passes through canyons and up steep slopes to replace an older one, which runs along an exposed portion of the mountain, where winds sometimes reach 100 mph during winter storms. It will serve Santa Barbara television station KEY-T. A second portion of the line, to be built later, will reach radio outposts of the Santa Barbara County sheriff and the U. S. Forest Service.

Saves on Brush Clearing

T. E. Ward, Salinas, Coast Valleys Division manager for PG and E, said the use of helicopters for the job saved both time and money, and would be considered for future construction projects. Using the "choppers" eliminates the need for expensive clearing of brush and trees to establish access roads.

PG and E also used a two-place Bell helicopter to lay a 30,000-ft power line extension in Alameda County.

In this case, power poles were set by ground crews, and the helicopter was used to string the conductor. The helicopter paid out a "pulling in line" or airplane cable, which was attached to the conductor and pulled it into place over the poles, where it was attached to insulators. The job was done in 15,000-ft stages — first 7,000-ft, and then 8,000-ft.

Top photo shows ground man starting stringer line. After start, line flows freely. In five miles of stringing, pilot missed one crossarm. Pictures below show line paying out freely. Canisters hold 7,000 ft of line. Lines didn't foul on any of the pulls

The New Mexico power pool operating committee (names of members listed below) discuss problems regarding the pool

They laughingly call it the Mutual Aid Society—it's really the operating committee of . . .

The New Mexico Power Pool

W. F. Resch, Manager, Rio Grande Project, USBR, El Paso, Tex.

The New Mexico Power Pool originated during World War II. It was made up of the Bureau of Reclamation's Rio Grande Project, the El Paso Electric Co., the Community Public Service Co. and the Deming Ice & Electric Co., utilizing the then-existing interconnected transmission systems of these companies in New Mexico and west Texas. The pool idea of operation developed as a result of need to help each other.

Following World War II, a rapid increase in the demand for electric power took place in New Mexico as new industry and new people were drawn to the state. New generating capacity, transmission lines, substations and distribution lines were constructed by all members of the pool.

Today's Pool

Today, the pool consists of the following systems, whose service areas include a large portion of New Mexico and the western tip of Texas:

Bureau of Reclamation (Rio Grande Project)
Community Public Service Co.
El Paso Electric Co.
Plains Electric Generation & Transmission Cooperative
Public Service Co. of New Mexico

The central location of the bureau's transmission system, with respect to the other pool members, lent itself admirably as carrier for wheeling energy from one part of a company's system to another, as well as from one company to another.

In January 1952, following establishment of a pool interconnection with the Public Service Co. of New Mexico at Albuquerque, regular meetings of the operations people in the pool systems were begun. The participants in these meetings are the people who really make the "wheels go 'round"—the plant superintendents, the supervisory operators, the engineers responsible for system operation and maintenance, and others closely associated with operations.

Pool Operating Committee

Pictured above, left to right, are:

Shrader Moore, Community Public Service Co.
Marvin Fuller, CPS
Harry Finch, Public Service Co. of N. M.
Harold Smith, El Paso Electric Co.
W. D. Leigon, U. S. Bureau of Reclamation
D. E. Rossow, EPE
E. W. Eggleston, USBR
Labon Backer, USBR
G. A. Frederick, USBR
E. L. Kirchmeier, Plains Electric Generation & Transmission Cooperative Inc.
J. J. Reddin, PS of N. M.
R. T. Armstrong, Plains EG&T
W. M. Thompson, EPE

Pool Operating Committee

These opportunities to talk together and lunch together have permitted these men to become good friends. As a result, there is no reluctance or hesitance on anyone's part to telephone one of the others and ask for assistance or to discuss troubles. The pool is a kind of "mutual aid society" for these operating people. Some items—

- To avoid a dangerous reduction in reserve system generating capacity, annual maintenance of boilers and generators is coordinated and scheduled for the coming year, usually at the November meeting.

- Load forecasting is also made a part of pool meeting discussions and review, in order that any unusual load increases may be mutually provided for, if necessary.

• Exchanges of experience and practices take place between pool members and inspections of each other's facilities are encouraged. Efforts are constantly being made to improve the exchange of intelligence between dispatching centers.

• Major transmission line and substation maintenance or modifications, requiring extended outages that would disrupt the normal power flow, are planned in advance and arrangement made as required between pool members for temporary power supplies during the outage periods.

• Satisfactory rates and methods of compensation among the member companies have been worked out for supplying and wheeling power and energy when necessary under special system conditions.

Dispatching From Elephant Butte

Dispatching of power is normally handled by the bureau at Elephant Butte Dam which, because of its central location in the system and the fact that the bureau is wheeling power and energy for all of the pool members, makes this a most satisfactory arrangement. A combination of carrier telephone communications between all important dispatching centers and telemetered data from major interconnection points permits satisfactory coordination for the operation of the system.

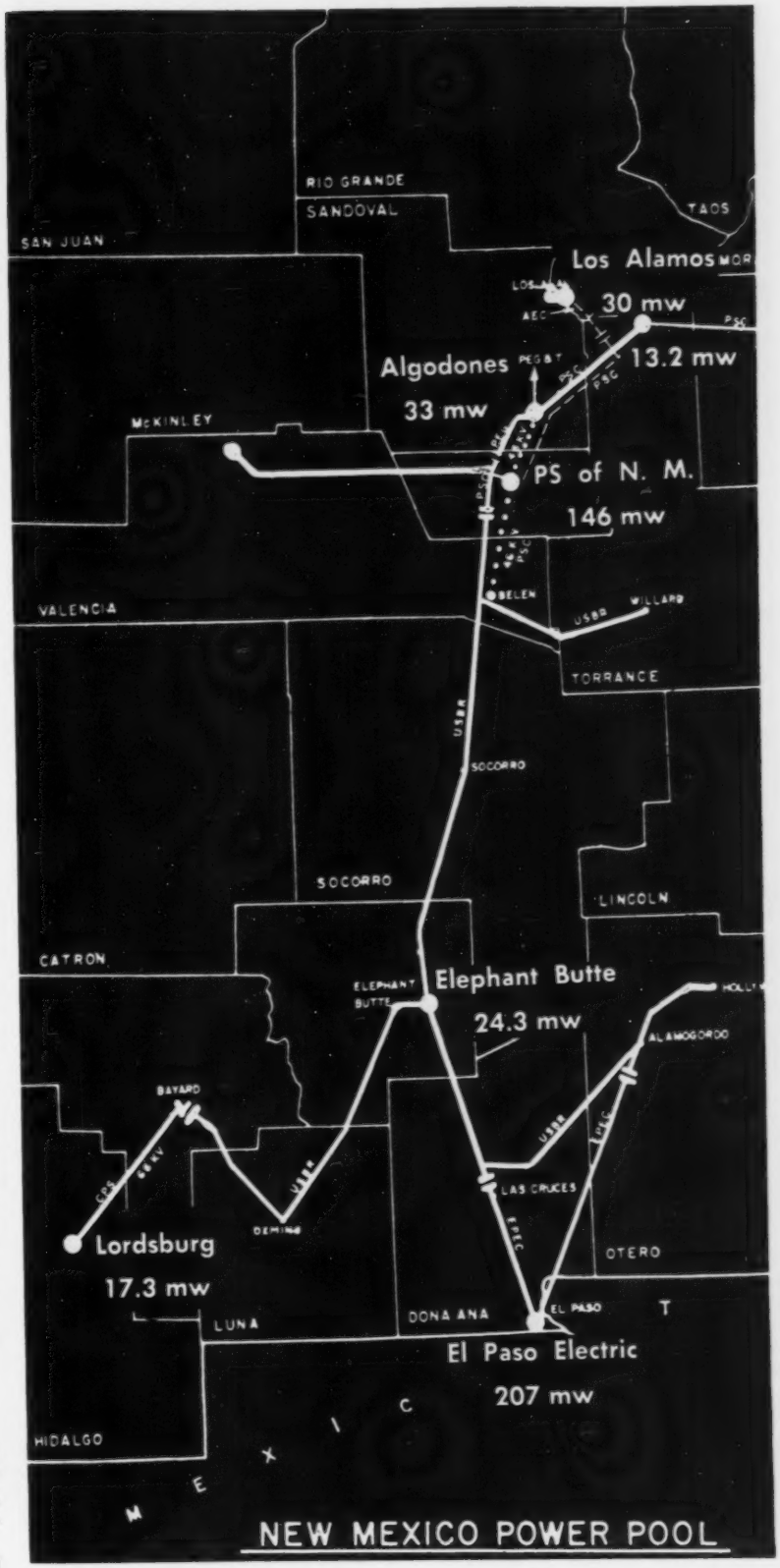
Plan Formalized

In 1956, a contract between all pool members was executed to formalize some aspects of pool operation and to change others. Under this arrangement, provision was made to firm up the bureau's power obligations to some customers so as to insure their power supply even during very adverse water storage conditions. Specific agreements were made for accounting for power and energy deliveries, including fair allocation of transmission losses. Provision is made to anticipate need jointly for increased capacity of facilities as the requirement may develop.

Teamwork Pays Off

The interconnected pool system reached a peak load of 320,940 kw in July 1957. During that month, generation for all system plants totaled 168,426,240 kwh.

Cooperation between the pool members has been excellent—to the benefit of all concerned.



Major interconnections on the New Mexico power pool are shown on the map. Also shown are the major power sources owned by the six participating companies

Left to right: A. A. Noon, Puget Sound P&L; W. C. Baylis, Niagara Mohawk Power; J. M. Nelson, Rural Co-op. Power Assn.; F. M. Henderson, Corn Belt Electric Power Co-op.; J. C. Livesay, Colorado Central Power; B. A. Currie, Los Angeles Department of W&P, chairman of the frequency coordination committee, NCUR; G. T. DeLaMatyr, Gulf States Utilities; C. H. Summers, Florida P&L; H. E. Troutman, Dayton P&L; T. R. Ferry, PG and E; J. E. McMasters, NEGEA Corp.—A hard to get group portrait taken between work sessions

NCUR

What it is
How it grew
How it serves our industry

The National Committee for Utilities Radio is the representative of the nation's electric, gas, water, and steam utilities in matters affecting these utilities communications interests before the Federal Communications Commission. The importance of this group becomes apparent when we consider the increasing dependence that all utilities have placed on radio communications in recent years for safety, speed and economy.

The radio spectrum, which is finite, cannot be used freely but is closely regulated by the Federal Communications Commission. In order to assure that the nation's utilities are provided with an adequate number of frequencies to enable them to carry on their business etficiently, an organization such as NCUR is absolutely necessary.

How It Grew

NCUR, as we know it today, developed from Committee Four, Panel 13 of the Radio Technical Planning Board, which was established at the request of the FCC during World War II. The purpose of the board was to plan for the orderly development of numerous new and diverse types of radio services, which the commission expected to appear at the war's end.

Committee Four, composed of representatives of all utilities, appeared before the FCC from 1944 to 1949, and successfully urged the assignment of frequencies and the adoption of practical operating rules that for the first time properly recognized the power utilities' vital need for radio. NCUR, and its predecessor committee, assisted in the organization of regional committees comprised of licensees in the Power Radio Service. The delegates from these committees actually represent the individual licensees in all matters within NCUR's purview. By this dual sponsorship of both trade associations and regional committees, NCUR truly represents all the licensees in the Power Radio Service.

How It Serves Locally

Based on a national plan, local frequency coordination advice is given by the regional groups to prospective applicants for authorization in the Power Radio Service.

The Western United States is represented in NCUR not only through the NCUR's Regional Northwest Utility Radio Assn., Rocky Mountain Utility Radio Assn. and the Southwest Committee for Utilities Radio but also by membership representatives of several outstanding utilities of the west area on the NCUR executive council. For example, W. A. Leidigh Jr. of Portland General Electric Co. is chairman, and R. A. Benson of Seattle City Light Department is alternate chairman of the NCUR Operating Practices Subcommittee, which has recently published an operating manual to guide utilities in setting up their own best radio procedures manual. B. A. Currie of the Los Angeles Department of Water & Power has just completed a most intensive season as chairman of the National Frequency Coordination Subcommittee. J. C. Livesay of Colorado Central Power Co. is the new chairman of this most important program. Also, L. E. Ludekens of Southern California Edison Co. is NCUR's representative on the Operational Fixed Microwave Council, which is the users' interservice voluntary and advisory group to guide the growth of the nation's private

microwave communications systems through cooperative efforts among those eligible to use microwave facilities in their operations.

National Representation

Since its inception, NCUR has been actively protecting the radio interests of the utilities and has appeared in many important proceedings before the Federal Communications Commission. During the past year, one of the major items of interest before the Federal Communications Commission has been the microwave hearing that commenced in May 1957. This hearing dealt with the allocation of frequencies in those bands of the radio spectrum above 890 mc. For approximately a decade the commission has been licensing microwave facilities to private use on a "developmental" basis. The gas, electric and water utilities have been among the leaders in the application of this valuable new multipurpose communications tool and the utilities' dollar investment in microwave facilities is now measured in the millions.

During the hearing proceedings, representatives from several of the Western utilities presented very valuable testimony to the Federal Communications Commission. Among those appearing were James F. Davenport, executive vice-president of the Southern California Edison Co.; Ivan L. Bateman, chief electrical engineer and assistant manager of the Department of Water & Power of the city of Los Angeles; and L. E. Ludekens, electronic engineer for the Southern California Edison Co. The outcome of this proceeding will determine to what extent the nation's utilities will be able to continue and expand the use of microwave. NCUR, through the above-mentioned witnesses, and others from all over the country, has made an extremely strong case for the utilities, and NCUR's representatives in Washington are following this proceeding closely on your behalf.

In sum, NCUR is performing a vital service for the utilities, not only in the West, but all over the nation, in an effort to assure that the electric, gas and water utilities are fairly represented before that government agency which regulates our use of that vital communications tool—radio. Because NCUR is the representative organization, it needs the full support of all members of our industry. Because of the outstanding job it is doing in protecting radio rights, it deserves this support.

Can foreign cars cut utility car pool expenses? A utility transportation official (6,800 vehicles) tells . . .

My Experience With the Bugs

Those little foreign cars you see buzzing around the landscape these days are rapidly being thought of as more than oversized toys.

They just might prove to be the answer to cries for less expensive, reliable transportation being sounded by companies whose vehicles roll up millions of miles per year on U. S. highways.

"They get you there and get you back," is the way an official of a major utility put it recently.

"We want to provide good service at low cost," he added.

"And therefore, we're constantly on the lookout for something that will improve our operation—make it more efficient.

"People's reactions to the little cars are interesting. No one is on the fence. At first everyone wanted to drive one to get the feel. Now the lines have been drawn and people either have to have or don't want them. There are plenty that want them though, we never see one in the garage."

The foreign-automobile experiment was part of the firm's search.

Some two dozen German-made autos were purchased two years ago and stationed in various parts of California.

There's been more than one eyebrow lifted since at their performance.

Save on Fuel

The cars, as a whole, have averaged some 32 miles per gallon of gasoline.

"We put one truck model on a particularly tough delivery run in San Francisco and it averaged between 11 and 12 miles per gallon. We were disappointed, so we tried an American truck on the same route and took another reading. It averaged out to less than half of what the German vehicle produced."

Oil consumption is virtually nil.

"The engine is so designed that its moving parts are easily lubricated. It has a short stroke and the oil capacity is only five pints. Every now and then it might take a teacupful."

Save on Maintenance

For one thing, they've been described as "a marvel of maintenance."

For another, there's the opinion that "after you get used to them, they're easier to handle than many American cars. They steer better and brake better."

The cars, thus far, have traveled an average of about 20,000 miles each, with but two repair jobs in the lot. One was a worn clutch. The bill to fix it came to $25. To remove an engine and put it back costs $9.30.

There's no estimate yet on tire wear, because they haven't started to wear down yet.

Save on Purchase

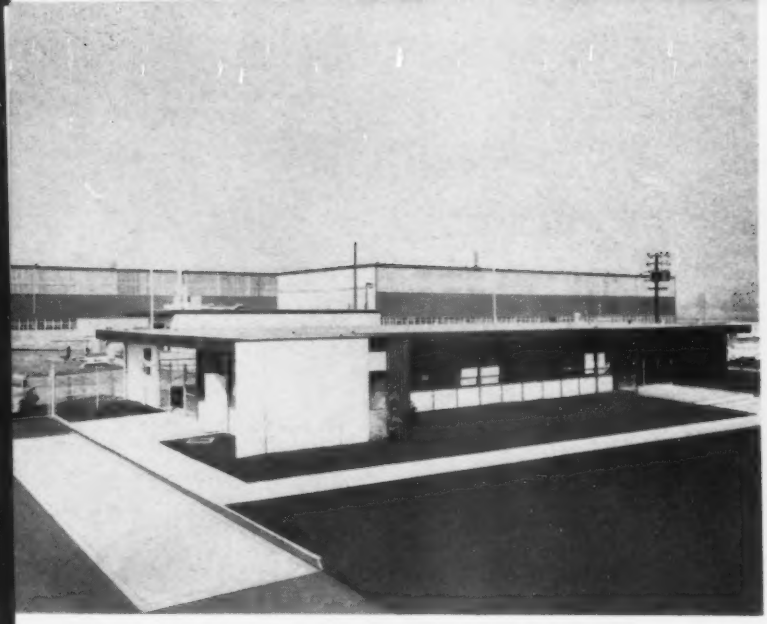
And savings on the initial purchase price run between $400 and $500, compared to an American vehicle bought for the same purpose.

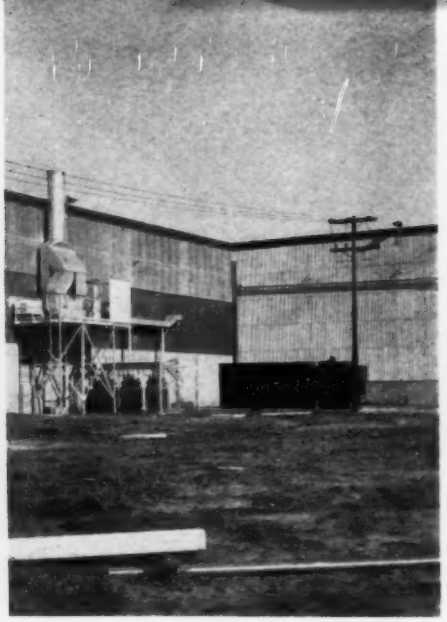
"We're still strictly in the experimental stage," the official said, "but thus far, the results have been good.

"Meanwhile, we've kept telling American engineers that we're looking for a passenger car suitable for fleet operation. We're not interested in chrome, or overhang or high horsepower.

"We want a car that will do the job for us cheaply, safely and efficiently.

"We owe it to our customers and ourselves to keep looking for it."





Totally enclosed substation does not move as plant expands. Transformers, left, serve four 200-kva furnaces

Spend money now to save later . . .

Planning a Plant for Growth

Fred M. Reibin
Electrical Engineer, Garretson & Elmendorf, Consulting Engineers

When you know your plant is going to get bigger, it pays to build flexibility into its electrical system. This was the attitude of Titan Metal Manufacturing Co. as the planning for its new brass mill at Newark, Calif., was started.

The $3,000,000 Newark installation is the first of its kind in northern California and also the company's first manufacturing venture away from headquarters at Bellefonte, Pa. Because of its proximity to a rapidly increasing Western market, Titan executives believe that the plant will be ultimately turning out more than 25,000,000 lb of brass and bronze products annually. Emphasis on a flexible, expandable electrical system is important because the operation of the manufacturing process is dependent on electric power from the melting of raw copper and other metals to the final annealing of the finished rod.

Regarding the electrical facilities for the new plant, the Titan industrial engineering department specified that the electrical system must have capacity for load growth, for plant expansion, flexibility for plant equipment changes, safety of operation, reliability, and must accommodate voltages of some existing equipment from the parent plante in Bellefonte.

Plant Substation

Location of the plant substation is typical of the planning that characterizes the entire electrical system. It is at the inside corner of the L-shaped plant building, in a position for the shortest cable runs for the present plant. Its location will also be at the center of plant buildings upon future expansion.

Three-phase, 12,000-v power is delivered to the substation by a pole line entering the service area. Reliability of service is assured by this dedicated line for sole use by Titan as well as alternates available in case of an emergency.

Pacific Gas and Electric Co. cooperated with the consulting firm of Garretson & Elmendorf to provide a three-phase main transformer with a primary voltage entrance compartment that could accommodate a riser cable conduit. In addition, the transformer was designed for a direct throat connection to the 4,160-v outdoor metal-clad weatherproof switchgear. Totally enclosing the primary cable and secondary connections eliminated the need for a fence around the substation, leaving the service area open for free movement by maintenance personnel.

Although the present transformer is rated at 3,750-kva, with provisions for forced air cooling, the concrete pad is designed to take an ultimate 10,000-kva transformer. The primary riser conduit is laid directly on the pad to permit easy changing of the transformer when the plant expands.

Interrupting capacity of the draw-out type, air circuit breakers is 250,000 kva—again with the future in mind. It is geared to the ultimate size of the plant supply transformer as well as projected plans of PG and E to establish a high-capacity substation in the immediate vicinity of the plant.

"Future" features of the 5-kv primary switchgear, which is of the outdoor, weathertight, metal-clad type, are channels and capped-off conduits for installation of additional circuit breaker cubicles when they are needed. Seven cubicles now installed house power company meters, auxiliary power transformer, main circuit breaker and four feeder circuit breakers.

All feeder circuit breakers are equipped with induction-type over-

current relays for overcurrent protection and residual ground relays for ground fault protection.

Plant Primary Distribution

Within the plant are both fixed equipment loads and those considered subject to relocation. An example of the first is a bank of four 180-kva induction melting furnaces, and the loads that may be moved are the plant's two load center substations.

The primary distribution system is 4,160-v grounded wye utilizing 5-kv nonshielded Okolite-Okoprene cables for ease of handling and terminating. Fixed loads are supplied through underground transite conduits.

Anticipated shifting of load centers led to the use of cable runs enclosed in metal troughs that are engineered to provide maximum salvage of materials and cable when plant revisions are made, and when load centers shift as the plant expands.

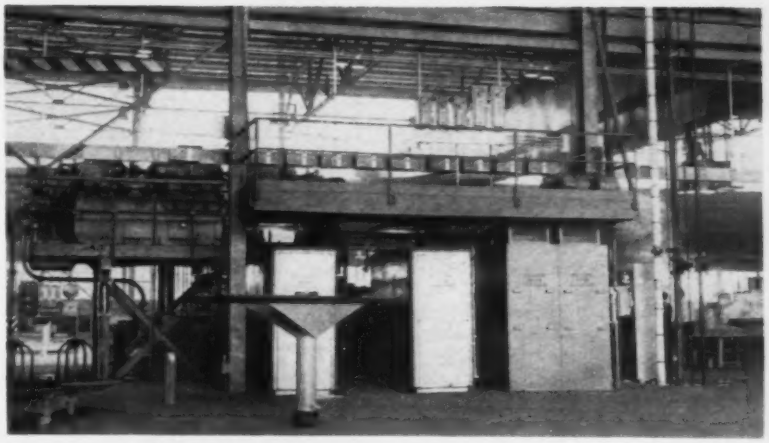
The flexibility is achieved by using 3x12-in. metal trough with divider strip and removable cover to supply the first of the two load center substations. Supported from the roof purlins, the trough has a drop-out elbow to supply one unit substation and then continues in the roof trusses to the second unit substation. Between the first and second substation the trough is reduced to a 3x6-in. size. Installation of long cable runs in the wireway drew favorable comments from supervisors for Newbery Electric Corp., the electrical contractor, because of labor that was saved. Long sweep trough elbows allowed pulling of each cable in one pull.

Unit Substations

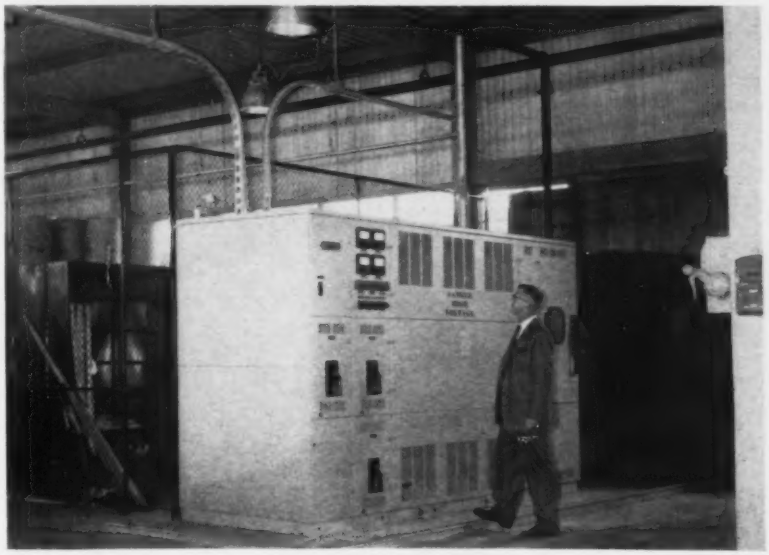
Two unit substations supply 480-v plant power. Primary connection is 4,160-v delta, and the secondary is 480-v wye-connected with a solidly grounded neutral. Prompt clearing of grounded apparatus, elimination of multiple ground fault conditions and ease of location of grounded apparatus or conductors were factors leading to selection of the grounded neutral system.

One of the 750-kva substations is located in the center of the plant on top of the plant foreman's mezzanine office to keep the floor clear for production machinery. The other is centrally located on one side of the plant in a low bay section. As has been mentioned, both are subject to relocation or expansion.

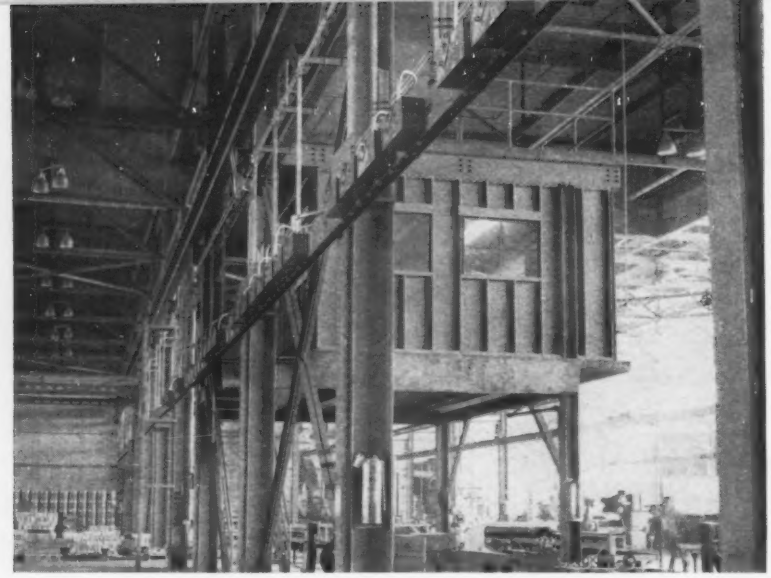
Four 200-kva induction furnaces are representative of fixed load centers in plant



Controls for induction billet heaters; 350-hp synchronous motors are in cabinets



W. F. Manning, industrial engineer, stands by R&IE movable-expandable substation



Wireway to underground circuits is barely visible on columns; bus duct is above

An expansion feature in the overhead substation is roof slab space for an additional future substation that can be supplied by the existing primary cable.

Bus Duct System

Again, ease of installation and maximum salvage and flexibility during plant revisions received prime consideration in engineering the bus duct system.

Plug-in bus duct of 480-v, 400-amp capacity is installed the full length of the plant on every column line of the production area. Suspension is with vertical Kindorf channels that also support branch conduit runs. Specially designed vertical wireways at the columns carry the conductors from the bus duct branch conduits to the underground runs, leaving columns uncluttered by conduits.

Three-conductor, aluminum-armored Rockbestos cables in aluminum trays are suspended from roof purlins for bus duct runs.

Metering Facilities

In order to maintain accurate cost control of each "melt," each induction melting furnace control panel is equipped with a kilowatt-hour meter as well as indicating ammeters, voltmeters and wattmeters.

Accurate division of loads on the feeder system is achieved by using indicating ammeters on each 4,160-v feeder and 480-v feeder. Ammeters are complete with three-phase metering jacks for installation of recording meter in each circuit whenever desired.

From the metering system comes the information used in planning plant operating revisions and calculations of the exact cost of operation of each production department. In effect, the metering system is an important management information source.

Plant Lighting

As usual, production efficiency ties in directly with good lighting, so thirty-two footcandles of illumination is maintained at working levels throughout the production areas. Dual-unit Holophane industrial luminaires with glass reflectors house color corrected mercury vapor lamps to get the desired light level.

Incandescent lights are spaced throughout the production area to provide protective lighting. Outdoor areas adjacent to the building are illuminated with color corrected mercury vapor lamps. Street lighting luminaires centrally controlled from the watchman's office illuminate parking areas and roadways.

Floodlights and security lights are automatically controlled by coded impulse relays actuated from a master clock system. Six carrier current channels are fed into the 480-v distribution system for control of all job and time clocks and security lights directly from the convenience outlets. Another carrier channel is utilized for the plant paging system operated from a master station at the reception's desk in the office.

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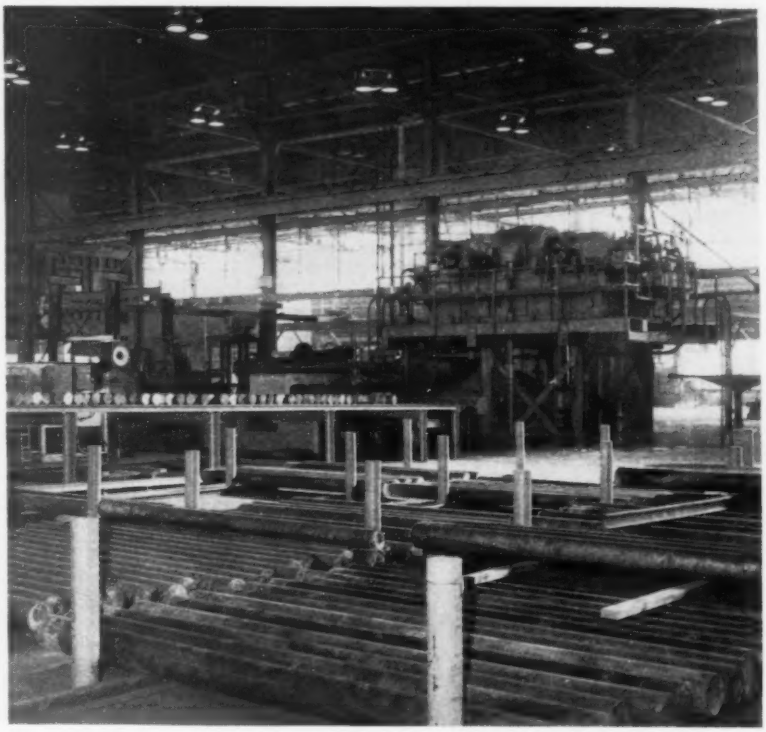

Holophane fixtures maintain 32 f-c illumination at work levels throughout plant

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(*Continued on page 80*)

Domestic and Farm Customers—Electric
(Estimated)

State	Residential and Rural	Urban	Rural Nonfarm	Farm
Arizona	**276,000**	179,741	88,009	8,250
California	**4,311,000**	3,604,110	587,690	119,200
Colorado	**476,500**	322,358	117,842	36,300
Idaho	**189,500**	90,972	60,978	37,550
Montana	**190,500**	94,320	67,380	28,800
Nevada	**69,500**	42,608	24,692	2,200
New Mexico	**203,000**	130,614	54,786	17,600
Oregon	**517,000**	300,333	163,717	52,950
Utah	**220,000**	148,042	49,558	22,400
Washington	**822,000**	547,781	209,869	64,350
Wyoming	**91,000**	53,330	27,670	10,000
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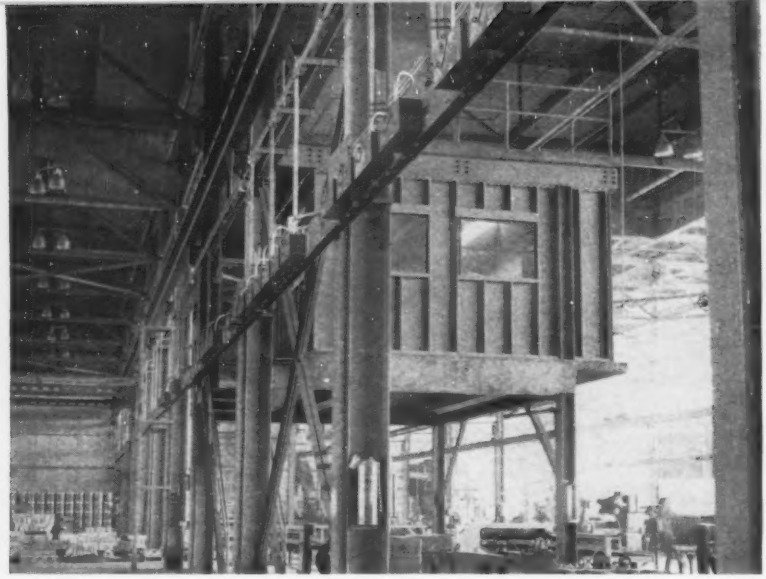

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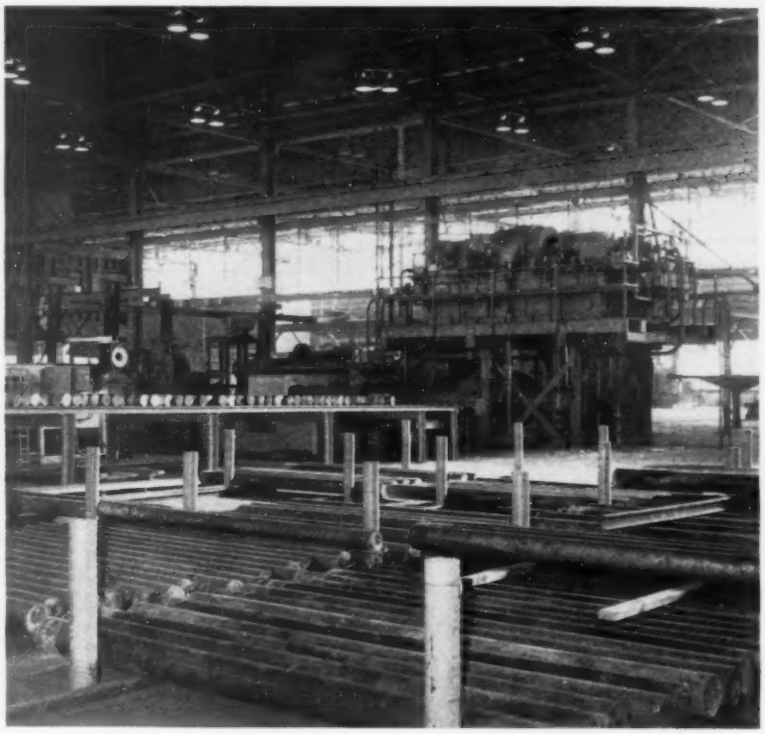

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Record on Customers and Residential Consumption

Taken from reports of sales executives

Utility Territory	Average Annual Kwh. Residential				Customers Residential—Urban and Rural		Commercial and Industrial		Agricultural Power	
	1957	1956	1955	1954	1957	1956	1957	1956	1957	1956
PG and E	2,923	2,747	2,616	2,458	1,469,460	1,425,095	260,128	258,040	70,306	68,734
Southern Calif. Edison	2,288	2,165	2,033	1,931	1,244,393	1,180,341	175,038	169,052	24,227	23,920
Los Angeles Dept. of W&P③	2,158	2,106	1,972.8	1,905.6	719,302	693,286	136,570	133,788		
PS of Colorado	2,541	2,362	2,236	2,102	255,204	247,781	37,949	37,228	279	344
Pacific P&L	6,931	6,563	6,108	5,622	240,357②	239,244②	35,221	35,673		
San Diego G&E	2,751.71	2,639.23	2,574.86	2,394.97	235,799	223,845	35,723	34,602	4,594	4,617
B. C. Electric, Vancouver	4,461	4,202	3,861	3,440	224,910	214,455	38,440	36,897		
Portland GE	8,422	8,103	7,645	6,929	212,706	209,897	27,087	26,658	①	①
Seattle City Light	7,961	7,786	7,488	7,078	203,320	199,858	22,194	21,997	0	0
Utah P&L	4,047	3,891	3,785	3,545	185,774②	181,089②	22,631	22,215		
Puget Sound P&L	7,642	7,205	6,540	5,854	180,640	173,567	19,028	18,403	290④	305④
Arizona PS	3,180	2,962	2,682	2,570	127,939	122,617	24,343	23,282	1,076	920
Washington Water Power	8,095	7,845	7,487	6,910	127,522	122,368	15,864	15,248		
Montana Power	3,685	3,471	3,241		121,535	118,836	19,968	19,723		
Sacramento MUD	3,338	3,065	2,817	2,705	116,430	111,562	14,775	14,831	3,812	3,789
Idaho Power	6,764	6,463	6,185	5,780	106,815	105,146	16,328	15,781	3,989	3,828
Hawaiian Electric	4,225	3,983	3,788	3,501	86,928	83,309	15,606	15,473	①	①
Calif. Elec. Power	2,427	2,349	2,220	2,130	81,349	75,055	12,971	12,420	2,295	2,332
Calif. Oregon Power	8,666.55	8,420.9	8,005.53	7,509.89	70,664	70,921	14,528	14,411	1,508	1,449
PS of New Mexico	2,332	2,132	1,941	1,846	74,779	71,821	9,842	9,702	701	717
El Paso Electric		2,936	2,643	2,527	72,078	69,583	8,956	8,825		
B. C. Power Commission	3,573	3,279	2,796	2,448	62,385	57,443	11,525	10,840		
Tucson GEL&P	2,712	2,521	2,255	2,139	56,388	53,924	8,965	8,794	360	334
Tacoma City Light	9,400	8,977	8,504	8,212	53,831	52,824	7,238	7,158		
Salt River Power District	4,278	4,023	3,879	3,835	54,433	48,113	4,572	4,035	288	
PUD No. 1 of Snohomish County	8,329	7,746	6,833	5,857	49,763	48,639	4,762	4,727		
B. C. Electric, Victoria	3,908	3,605	3,317	2,998	43,437	41,896	7,083	6,827		
Pasadena L&P Dept.	2,396	2,235	2,093	1,955	41,713	41,349	6,234	6,206		
Southern Colorado Power	2,330	2,217	2,068	1,957	39,136	38,252	5,604	5,586	888	508
Sierra Pacific Power	4,930	4,759	4,548	4,274	31,222	29,378	5,601	5,312	808	793
Burbank PS	2,460	2,330	2,198	2,140	30,482	30,502	5,824	5,812	0	0
Southern Nevada Power	9,372	9,777	10,094	9,864	24,817	22,610	6,748	6,841	0	0
PUD No. 1 of Clark County	9,424	8,887	8,149	7,206	28,206	27,999	3,227	3,122		
Southwestern PS, Roswell Div.	2,539	2,317	2,047	1,915	26,955	25,967	3,134	3,648		
Calif.-Pacific Utilities	6,104	5,729	5,464	4,952	24,369	24,163	5,171	5,084		
Colorado Central Power	2,677	2,490	2,345	2,177	25,862	24,355	2,547	2,445	397	414
Imperial Irrig. Dist.	5,892	5,700	5,251	4,891	21,616	21,225	5,068	4,955	957	929
Modesto Irrig. Dist.	3,755	3,525	3,333	3,154	22,048	21,517	3,572	3,358	501	466
Eugene W&E Board	9,908	9,000	8,225	7,533	22,665	22,221	3,320	3,264		
PUD No. 1 of Grays Harbor Co.	8,326	7,549	7,175	6,295	17,586	17,628	3,464	3,387	110	103
PUD No. 1 of Cowlitz County	12,207	11,885	10,840	8,907	18,889	18,930	2,418	2,383		
Anaheim LP&W Dept.	2,000	1,800			16,801	14,411	782	701	32	30
PUD No. 1 of Chelan County	7,600	7,172	6,576	6,035	13,539	13,494	1,969	1,972	538	520
Alameda Bureau of Electricity③	2,295	2,238	2,136	2,069	13,728	13,671	1,615	1,646		
Cheyenne LF&P	2,676	2,503.2	2,356.62	2,202.51	12,776	12,326	2,199	2,177	23	21
Home L&P	3,115④	2,951	2,907	2,795	11,524	11,231	2,352	2,348	739	893
PUD No. 2 of Grant County	13,803	13,270	12,669	8,740	11,050	10,757	2,259	2,150	575	559
PUD No. 1 of Lewis County	7,784	7,664	6,898	6,192	10,436	10,549	1,062	1,067	51	63
Central Lincoln PUD	8,992	8,881	8,420		9,526	9,250	1,967	1,875		
New Mexico Elec. Service	2,715	2,488	2,167	2,002	8,949	8,166	1,925	1,745	49⑤	38⑤
Maui Electric	3,084	3,012	2,892	2,688	8,531	8,598	1,813	1,829		
PUD No. 1 of Benton County	11,872	11,183	10,243	8,966	8,103	7,982	1,052	1,080	150	116
Telluride Power	4,388	4,254	3,922	3,631	7,212	7,164	1,636	1,586	162	188
Anchorage L&P Dept.	2,920.16	2,894.33	2,554.42	2,295.82	6,182	6,186	1,683	1,680	0	0
Fort Collins L&P Dept.	2,570	2,245	1,963	1,740	6,218	5,944	1,309	1,118	0	0
PUD No. 2 of Pacific County	9,826	8,607	8,620	7,907	5,984	6,004	1,390	1,350		
PUD No. 1 of Franklin County	9,806	9,373	8,567	7,711	5,450	5,281	1,195	1,229	104	92
Mont.-Dak. Utilities	214	175	150	132	5,292	5,244	846	820		
Southeast Colo. Power Assn.	122④	117	108	95	4,750	4,844	689	562	427⑤	409⑤
PUD No. 3 of Mason County	7,354	7,132	6,651	5,955	5,308	5,267	569	562		
City of Mesa	3,008	2,944	2,665	2,598	4,458	4,226	942	920	0	0
Consumers Power	8,272	7,910	7,097	6,153	4,513	4,499	226	229	220	152
Lane County Elec. Co-op.	8,735	8,320	7,582	6,158	3,859	3,867	407	415	755	759
Northern Lights	5,489	4,681	4,363	2,907	3,028	2,912	292	271	111	86
Rawlins Electric	2,392½	2,314½	2,056		2,557	2,410	199	270		
Ketchikan PU	6,504	5,291	5,475	5,467	2,602	2,773	513	554	0	0
Raton PS	3,491	3,309	3,145	2,920	2,410	2,392	669	686	0	0
Roosevelt County Elec. Co-op.	787	270			1,780	1,801	109	104	835	703
Elko Lamoille Power	2,685	2,486	2,366	1,896	2,073	2,035	461	471		
Matanuska Elec. Assn.	258	275	242	223						
Lahaina L&P	3,204	3,213	3,155	2,888	1,285	1,305	197	185	0	0

① Included with other classifications. ② Includes agricultural power. ③ Fiscal year, ending June 30, 1957. ④ Urban customers only. ⑤ Includes all government and municipal accounts. ⑥ Irrigation.

for Electric Utilities in the 11 Western States

to Electrical West for the 12-month period

Street and Highway Lighting 1957	Street and Highway Lighting 1956	Resale to Other Electric Utilities 1957	Resale to Other Electric Utilities 1956	All Others 1957	All Others 1956	Total Customers 1957	Total Customers 1956	Utility Territory
1,554	1,376	28	28	3	5	**1,801,479**	1,753,278	PG and E
1,666	1,516	8	8	11,194	10,503	**1,456,526**	1,385,340	Southern Calif. Edison
1,786	1,671	2	2	321	311	**857,981**	829,058	Los Angeles Dept. of W&P
108	102	7	7	1,317	1,232	**294,864**	286,694	PS of Colorado
855(5)	868(5)	7	8	10	10	**276,450**	275,803	Pacific P&L
102	103	9	9			**276,227**	263,176	San Diego G&E
44	39					**263,394**	251,391	B. C. Electric, Vancouver
253	225			1,132	1,094	**241,178**	237,874	Portland GE
3	3	0	1	897	870	**226,414**	222,729	Seattle City Light
443	415	33	32	86	77	**208,968**	203,829	Utah P&L
237	189	9	9	145	143	**200,059**	192,311	Puget Sound P&L
289	271	8	8			**153,655**	147,098	Arizona PS
249	232	11	11	1	1	**143,647**	137,860	Washington Water Power
369	445	60	51	161	146	**142,093**	139,201	Montana Power
65	59	1	1	48	42	**135,131**	130,284	Sacramento MUD
158	148	6	5			**127,296**	124,908	Idaho Power
373	349			2	3	**102,909**	99,134	Hawaiian Electric
162	138	11	10	80	68	**96,868**	90,023	Calif. Elec. Power
167	162	5	5	80	76	**86,952**	87,024	Calif. Oregon Power
				15	22	**85,337**	82,262	PS of New Mexico
4	4	4	2	1,367	494	**82,409**	78,908	El Paso Electric
127	92					**74,037**	68,375	B. C. Power Commission
5	5					**65,718**	63,057	Tucson GEL&P
43	34	19	18			**61,131**	60,034	Tacoma City Light
9	8	1	1	152	105	**59,455**	52,262	Salt River Power District
24	20	1	2	39	31	**54,589**	53,419	PUD No. 1 of Snohomish County
6	6					**50,526**	48,729	B. C. Electric, Victoria
				467	358	**48,414**	47,913	Pasadena L&P Dept.
20	20	5	5	922	903	**46,575**	45,574	Southern Colorado Power
						37,631	35,483	Sierra Pacific Power
1	1	0	0	0	0	**36,307**	36,315	Burbank PS
3	3	2	2	6		**31,575**	29,456	Southern Nevada Power
				117	117	**31,550**	31,238	PUD No. 1 of Clark County
14	12	1	1	141	132	**30,245**	29,760	Southwestern PS, Roswell Div.
44	43		1	18	18	**29,602**	29,309	Calif. - Pacific Utilities
23	20	1	1	318	283	**29,148**	27,518	Colorado Central Power
26	24	2	1	203	197	**27,872**	27,341	Imperial Irrig. Dist.
4	3	1	1	183	238	**26,309**	25,583	Modesto Irrig. Dist.
6	5					**25,981**	25,490	Eugene W&E Board
28	23	2	1	318	313	**21,508**	21,455	PUD No. 1 of Grays Harbor County
9	13	3	2	15	5	**21,334**	21,333	PUD No. 1 of Cowlitz County
						17,615	15,142	Anaheim LP&W Dept.
18	11	2	2	2	2	**15,530**	15,481	PUD No. 1 of Chelan County
2	2			136	138	**15,481**	15,457	Alameda Bureau of Electricity
3	2					**15,001**	14,526	Cheyenne LF&P
34	33	0	0	224	236	**14,873**	14,741	Home L&P
26	24	0	0	9	8	**13,919**	13,498	PUD No. 2 of Grant County
16	15	313	307			**11,878**	12,001	PUD No. 1 of Lewis County
11	10					**11,504**	11,135	Central Lincoln PUD
		0	0	144	147	**11,067**	10,096	New Mexico Elec. Service
101	98					**10,445**	10,525	Maui Electric
13	13	0				**9,318**	9,191	PUD No. 1 of Benton County
38	38	16	15	255	250	**9,157**	9,082	Telluride Power
1	1	0	0	1	1	**7,867**	7,868	Anchorage L&P Dept.
1	1	0	0	115	117	**7,643**	7,280	Fort Collins L&P Dept.
6	6					**7,380**	7,437	PUD No. 2 of Pacific County
14	14	0	0			**6,763**	6,616	PUD No. 1 of Franklin County
3	3	1	1			**6,142**	6,068	Mont. - Dak. Utilities
				70	60	**5,936**	5,875	Southeast Colo. Power Assn.
6	7			7	7	**5,890**	5,843	PUD No. 3 of Mason County
62	68	0	0	25	23	**5,487**	5,237	City of Mesa
2	1	0	0	69	67	**5,030**	4,948	Consumers Power
2	2	0	0	0	0	**5,023**	5,043	Lane County Elec. Co-op.
				83	89	**3,491**	3,358	Northern Lights
1	1	0	0	520	501	**3,277**	3,182	Rawlins Electric
1	1	0	0	0	0	**3,116**	3,327	Ketchikan PU
1	1	0	0	0	0	**3,080**	3,079	Raton PS
1	1			48	50	**2,773**	2,659	Roosevelt County Elec. Co-op.
1	1			2	2	**2,537**	2,509	Elko Lamoille Power
								Matanuska Elec. Assn.
1	1	0	0	0	0	**1,483**	1,491	Lahaina L&P

The West's Appliance

	Residential Customers	Refrigerators	Ranges	Water Heaters	Home Freezers	Room Conditioners	Washers Automatic	Washers Conventional	Dryers
ALASKA									
Anchorage PU	6,182								
Ketchikan PU	2,602	50	50	40	30	...	40	20	...
Matanuska Elec. Assn.	...	100	20	25	50	...	75	10	75
ARIZONA									
Arizona PS	127,939	12,185	4,903	818	3,419	4,070	12,592	2,332	1,370
Mesa City Utilities	4,458	335	110	220	40	175	185	10	30
Salt River Power District	54,433	4,784	2,429	389	1,939	1,872	4,385	1,851	585
Tucson GEL&P	56,388	3,000	1,000	200	500	350	2,500	1,000	300
BRITISH COLUMBIA									
B. C. Elec., Vancouver	224,910	13,090	7,716	4,211	2,125	12	5,136	7,325	2,976
B. C. Elec., Victoria	43,437	2,811	1,735	507	833	...	1,246	1,292	537
B. C. Power Commission	62,385	...	2,900	2,900	...	...	...	...	...
CALIFORNIA									
Alameda PU Dept.	13,728⑦	250	200	5	100	...	250	50	250
Anaheim Dept. of LP&W	16,801	...	...	...	...	...	...	...	...
Burbank PS Dept.	30,482	275	230	22	20	375	300	60	150
Calif. Elec. Power	81,349	2,175	513	246	203	567②	3,512	...	363
Calif.-Pacific Utilities	24,369	858	932	691	508	190	980	700	820
Imperial Irrig. Dist.	21,616	1,450	350	200	175	2,300	1,400	750	125
Los Angeles Dept. of W&P	719,302⑦	74,600	5,600	1,830	4,500	14,700	61,400	3,100	9,000
Modesto Irrig. Dist.	22,048	...	...	...	...	...	...	...	...
PG and E	1,469,460	86,400	49,200	11,700	20,000	10,400	103,000①	...	42,000
Pasadena MU	41,713	...	687	44	...	...	...	...	...
Sacramento MUD	116,430	8,557	6,276	1,292	2,362	2,935	3,762	418	7,230
San Diego G&E	235,799	20,650	5,400	2,500	4,200	2,000	22,000	2,800	2,700
Southern Calif. Edison	1,244,393	150,300	26,300	8,400	...	40,000	...	...	34,000
COLORADO									
Colorado Central Power	25,862	350	400	60	150	100	425	200	300
Fort Collins L&P Dept.	6,218	846	306	...	262	228	330	...	220
Home Light & Power	11,524	...	...	...	...	...	...	...	...
PS of Colorado	255,204	22,300	11,100	...	4,900	1,100	26,000	4,300	9,200
Southeast Colo. Power Assn.	4,750	...	...	...	...	...	...	...	...
Southern Colorado Power	39,136	1,423	555	133	382	136	1,790	695	427
HAWAII									
Hawaiian Electric	86,928	6,500	4,149	4,683	1,800	250	7,500	1,000	1,019
Lahaina L&P	1,285	...	...	...	...	...	...	...	...
Maui Electric	8,531	511	234	222	162	15	349	87	17
IDAHO									
Idaho Power	106,815	7,421③	8,359	6,692	4,691	1,000	11,523①	...	7,133
Northern Lights	3,028	66	140	135	102	0	84	3	98
MONTANA									
Montana Power	121,535	7,200	6,700	1,500	3,300	325	8,000	...	7,000
NEVADA									
Elko Lamoille Power	2,073	...	...	...	...	...	...	...	...
Sierra Pacific Power	31,222	1,619	1,215	638	342	17	...	...	...
Southern Nevada Power	24,817	958	1,648	286	313	519	1,779	231	274
NEW MEXICO									
N. M. Elec. Service	8,949	737	218	...	529	1,524	817	107	150
PS of N. M.	74,779	5,219	2,169	352	2,422	...	6,848①	...	1,236
Raton PS	2,410	...	...	...	...	...	...	...	...
Roosevelt County Elec. Co-op.	1,780	15	12	23	43	30	32	16	16
OREGON									
Calif. Oregon Power	70,664	2,794	2,845	2,850	760	200	1,903	653	3,516
Central Lincoln PUD	9,526	...	...	...	...	...	...	...	...
Consumers Power	4,513	13	43	113	100	...	57	7	76
Eugene W&E Board	22,655	...	...	...	...	...	...	...	...
Lane County Elec. Co-op.	3,859	40	45	90	75	2	55	20	70
Pacific P&L	208,990	20,087	20,867	11,377	10,236	1,344	33,190	6,125	26,393
Portland GE	212,706	16,000	15,500	11,500	7,000	...	17,500	2,500	14,500
TEXAS									
El Paso Electric	72,078	6,678	2,795	2,123	1,911	1,714	...	...	1,018
Southwestern PS, Roswell Div.	26,955	1,508	751	331	1,059	225	2,231	481	614
UTAH									
Telluride Power	7,212	149	268	309	98	...	262	...	70
Utah P&L⑤	185,774④	12,001	12,586	5,923	5,172	3,766	16,140	4,712	9,256
WASHINGTON									
Benton County PUD No. 1	8,103	...	...	...	...	...	...	...	...
Chelan County PUD No. 1	13,539	682	744	739	346	19	805	119	302
Clark County PUD No. 1	28,206	1,200	1,200	1,500	500	50	1,200	100	1,200
Cowlitz County PUD No. 1	18,889	...	...	...	...	...	...	...	...
Franklin County PUD No. 1	5,450	...	...	...	...	75	...	...	200
Grant County PUD No. 2	11,050	...	...	...	...	243	...	...	...
Grays Harbor County PUD No. 1	17,586	...	440	450	...	...	...	...	200
Lewis County PUD No. 1	10,436	...	...	...	...	...	...	...	...
Mason County PUD No. 3	5,308	58	54	59	...	...	41	...	61
Pacific County PUD No. 2	5,984	215	245	275	110	...	500	100	400
Puget Sound Power & Light	180,640	7,751	9,415	9,026	1,925	...	8,789	200	7,131
Seattle City Light	203,320	19,000	15,000	8,000	5,000	...	15,000	...	14,000
Snohomish County PUD No. 1	49,763	2,500	2,500	2,500	1,000	10	2,500	200	1,800
Tacoma City Light	53,831	6,900	7,500	3,900	1,800	...	5,200	1,200	6,200
Washington Water Power	127,522	6,848	7,860	4,442	4,335	454	9,005	2,696	6,549
WYOMING									
Cheyenne LF&P	12,776	607	257	59	84	67	632	65	353
Montana-Dakota Utilities	5,292	264	148	10	133	16	235	69	135
Rawlins Electric	2,557	40	39	3	6	0	70	3	48

① Includes automatic and conventional. ② Includes 360 heat pumps. ③ Includes combination ref. – freezers. ④ Distributor reports. ⑤ Includes Western Colorado Power. ⑥ Includes farm power. ⑦ Fiscal year ending June 30, 1957. ⑧ Personal reports.

Sales Record for 1957

Combination Washer-Dryer	Ironers	Vacuum Cleaners	Dishwashers	Food Waste Units	Radio Sets	Television Sets	Utility Merchandise Yes	Utility Merchandise No	Appliance Estimated	Sales Dealer Reports	
											ALASKA
								X			Anchorage PU
10	2	100	3	8	150	40		X	X		Ketchikan PU
5	...		4	...	...	...		X	X		Matanuska Elec. Assn.
											ARIZONA
433			1,660		15,551	24,360		X		X	Arizona PS
12	50	170	60	80	400	350		X	X		Mesa City Utilities
132	73		651	561		4,505		X	X		Salt River Power District
100	100	2,000	350	250	4,000	5,000		X	X		Tucson GEL&P
											BRITISH COLUMBIA
395	112		443	83	19,989	21,434		X		X	B. C. Elec., Vancouver
53	26	2,334	68	23	3,160	5,439		X		X	B. C. Elec., Victoria
...	...	...	...	...	...	...		X		X	B. C. Power Commission
											CALIFORNIA
50	50	200	100	100	400	500		X	X		Alameda PU Dept.
...	...	...	...	...	...	...		X	...	...	Anaheim Dept. of LP&W
30	15	...	35	150	...	...		X	X	...	Burbank PS Dept.
35	...	...	106	...	...	...	X	...	...	X	Calif. Elec. Power
55	315	1,900	205	235	...	2,250		X	X	X	Cal.-Pacific Utilities
...	20	...	...	...	...	...		X	X	...	Imperial Irrig. Dist.
...	...	...	...	...	...	91,400		X	X	...	Los Angeles Dept. of W&P
...	...	...	...	...	...	...		X	...	...	Modesto Irrig. Dist.
400	...	...	23,000	22,800	123,000	155,000		X	X	X	PG and E
...	...	...	...	...	...	...		X	...	X①	Pasadena MU
1,343	...	...	2,599	3,646	...	13,752		X	...	X	Sacramento MUD
1,050	...	14,500	2,450	8,000	60,500	40,025		X	...	X②	San Diego G&E
...	...	...	24,277	...	...	212,000		X	X	...	Southern Calif. Edison
											COLORADO
100	...	...	...	...	...	...		X	X	...	Colorado Central Power
70	...	...	280	384	...	...		X	X	...	Fort Collins L&P Dept.
...	...	...	...	...	...	...		X	...	...	Home Light & Power
3,200	200	...	1,300	7,000	...	35,000	X	...	X	...	PS of Colorado
...	...	...	...	...	...	...	X	...	...	...	Southeast Colo. Power Assn.
235	50	944	124	573	1,950	2,320	X	...	X	...	Southern Colorado Power
											HAWAII
200	...	...	750	750	...	...		X	X	X	Hawaiian Electric
...	...	...	...	...	...	...		X	...	...	Lahaina L&P
...	...	122	26	28	735	614	X	...	X	X	Maui Electric
											IDAHO
1,000	2,000	15,000	1,500	2,000	8,000	16,000	X	...	X	X	Idaho Power
4	1	...	4	...	...	62	...	X	...	X③	Northern Lights
											MONTANA
1,000	...	...	1,500	1,000	...	11,800	...	X	X	...	Montana Power
											NEVADA
...	...	...	...	...	...	...		X	...	...	Elko Lamoille Power
...	...	...	...	...	...	...		X	...	X	Sierra Pacific Power
...	196	...	184	165	...	...		X	...	X	Southern Nevada Power
											NEW MEXICO
...	19	...	64	...	...	2,064		X	...	X	N. M. Elec. Service
...	940	...	468	267	...	8,894		X	...	X	PS of N. M.
...	...	...	...	...	...	150		X	X	...	Raton PS
1	1	15	...	...	...	174		X	...	X	Roosevelt County Elec. Co-op.
											OREGON
...	94	...	546	317	...	6,733	...	X	X	X	Calif. Oregon Power
...	...	...	...	...	...	...	...	X	...	...	Central Lincoln PUD
...	...	...	7	...	...	...	X	...	...	X④	Consumers Power
...	...	...	...	...	...	...	...	X	...	...	Eugene W&E Board
10	10	40	25	20	70	80	...	X	X	...	Lane County Elec. Co-op.
...	1,101	...	3,464	1,285	36,139	44,313	...	X	...	X	Pacific P&L
...	1,200	...	2,100	...	...	19,500	...	X	X	...	Portland GE
											TEXAS
...	...	...	709	...	...	15,066	X	...	...	X⑤	El Paso Electric
...	55	...	209	...	...	4,304	...	X	...	X	Southwestern PS, Roswell Div.
											UTAH
...	...	...	...	...	...	...	...	X	...	X	Telluride Power
...	2,455	22,514	2,185	4,449	26,629	21,186	...	X	...	X	Utah P&L
											WASHINGTON
...	...	...	...	...	...	...	...	X	...	...	Benton County PUD No. 1
47	22	309	94	68	700	1,000	...	X	X	...	Chelan County PUD No. 1
100	150	750	200	150	2,000	1,500	...	X	X	...	Clark County PUD No. 1
...	...	...	...	...	...	...	...	X	...	...	Cowlitz County PUD No. 1
...	...	...	...	...	...	...	...	X	X	X	Franklin County PUD No. 1
...	...	...	...	...	...	...	...	X	...	X	Grant County PUD No. 2
...	...	...	...	...	...	...	...	X	X	...	Grays Harbor County PUD No. 1
...	...	...	...	...	...	...	...	X	...	...	Lewis County PUD No. 1
...	...	...	8	...	15	43	...	X	...	X	Mason County PUD No. 3
10	50	100	75	30	500	400	...	X	X	...	Pacific County PUD No. 2
...	227	...	3,196	1,245	...	11,924	...	X	X	...	Puget Sound P&L
...	...	...	3,200	...	...	...	...	X	X	...	Seattle City Light
100	200	2,000	1,200	400	2,500	4,000	...	X	X	...	Snohomish County PUD No. 1
1,000	...	...	1,500	1,200	...	12,000	...	X	X	...	Tacoma City Light
812	213	6,923	1,378	433	13,404	15,336	...	X	...	X	Washington Water Power
											WYOMING
29	77	357	120	56	1,993	913	X	...	X	...	Cheyenne LF&P
7	6	215	34	24	464	945	X	...	...	X⑥	Montana-Dakota Utilities
28	5	0	8	10	0	53	X	...	...	X	Rawlins Electric

Utility Sales Report

(*Continued from page 75*)

California Pacific Utilities: E. A. Nickelsen, commercial manager, notes that during 1957 the usual substantial annual growth in electric revenues and the number of new customers served declined somewhat from previous years. However, electric revenues from residential customers increased approximately 4.5% for the year.

Electric revenues from industrial customers decreased due to the sharp reduction in production at lumber mills located on the company's Oregon system.

Annual residential electric use continued to increase and was up 6.5% for the year. During the past ten years annual kwh use per residential customer has increased from 2,179 to 6,104, Nickelsen reports.

Total unit sales on the company's system decreased only 2.8% as compared to more than 10% nationally. A majority of appliance dealers claim substantial increase in dollar volume because of a greater volume of de luxe models. Television also brought a large volume of sales in service areas where it has been available only for two or three years.

Los Angeles Department of Water & Power: Data on sales of appliances were compiled from industry-wide totals of distributor sales to Los Angeles city and county dealers and were then adjusted to the service area, according to W. F. Lovelace, manager of residential sales.

Although sales data on many appliances are not yet available for the full year, the department projected figures on the basis of the first nine-month reports from industry members and an 11-month report from another source.

Pacific Power & Light: Frank Reis, general sales manager, reports that Federal Power Commission classifications are used in his report. The rural classification includes both domestic and farm uses outside of incorporated city limits and irrigation may or may not be included depending on size and metering arrangement. The major part of the irrigation is reported under commercial load. The residential customer figure for 1957 includes 208,990 residential customers, 31,367 rural. The commercial-industrial figure includes 32,159 commercial and 3,062 industrial customers.

Puget Sound Power & Light: Customers are given as of December 1957; 290 irrigation customers are not included in total.

Charles K. Rieger (left), vice-president and general manager of General Electric's Major Appliance Division, and Harlan C. Davis, Denver branch manager

FHA Ruling Will Help

Among the nation's business leaders who think 1958 will be "at least as good – and possibly better – than 1957," is Charles K. Rieger, a vice-president for General Electric and general manager, major appliance and television receiver division. In Denver to meet dealers, newsmen and city officials at the opening of the new district offices and warehouse, he said that part of 1958's business will result from the recent Federal Housing Administration rule allowing modern kitchen and laundry equipment to be covered by the mortgage in purchase of a new home.

Rieger cited figures that showed monthly payments on a $10,000 home now run at $68.11 with no appliances and are increased under the new FHA rule to only $77.74 if a dishwasher, disposal, refrigerator and complete modern laundry are added to the original mortgage. The small extra monthly cost compares with payments of up to $70 per month if the appliances were purchased in the conventional way.

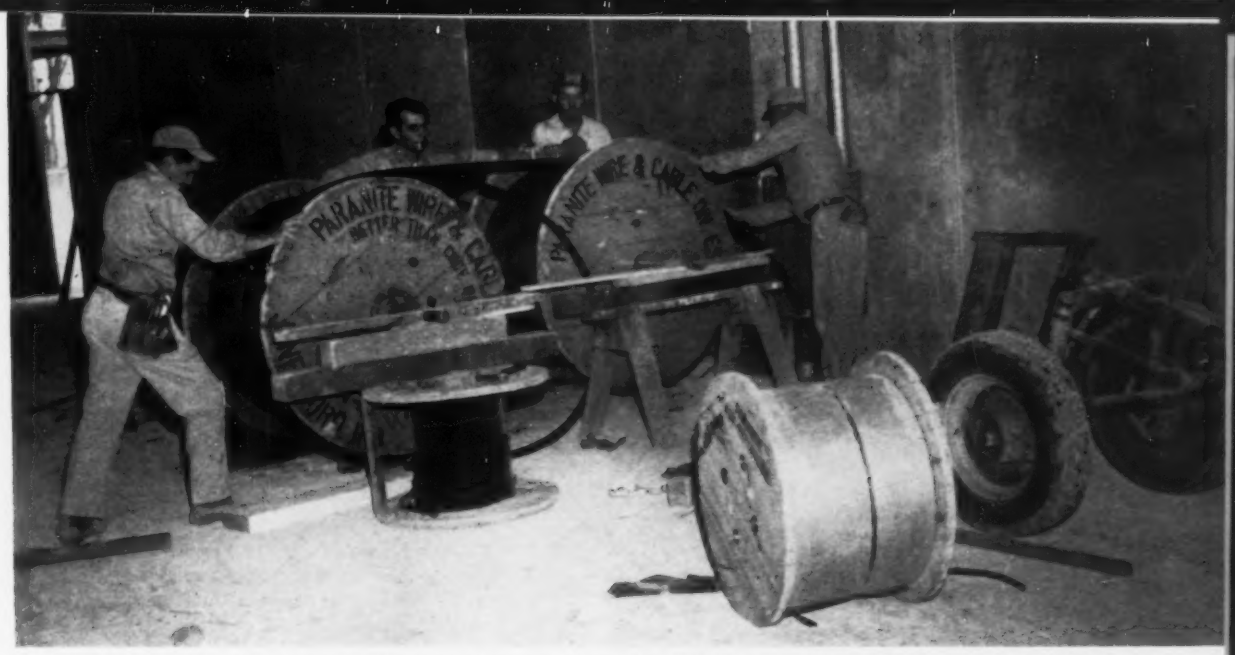
The Home—1978 Model

A glowing picture of the home of 1978 was painted by W. J. Maytham, vice-president and Pacific Coast regional manager of Westinghouse Electric Corp., in Seattle, Wash., Feb. 7 at a joint luncheon of the Seattle Chamber of Commerce and the Puget Sound Electric League.

Maytham predicted that "well over 100 home appliances will be available, more than half of which were not even on the market only 10 years earlier, in 1968." He sees common usage of such electrical items as heat pumps, electrostatic cleaning wands and ultrasonic washers. The kitchen will have drawers for refrigerated storage, the refrigeration being provided by a new application of the Peltier Effect, Maytham believes.

The nation's electric utility industry in 1978 will have 75,000,000 customers, 2.2 trillion kwh sales and an installed generating capacity of 550,000,000 kw, Maytham predicted. One-fourth of the installed capacity will be in nuclear plants, he believes.

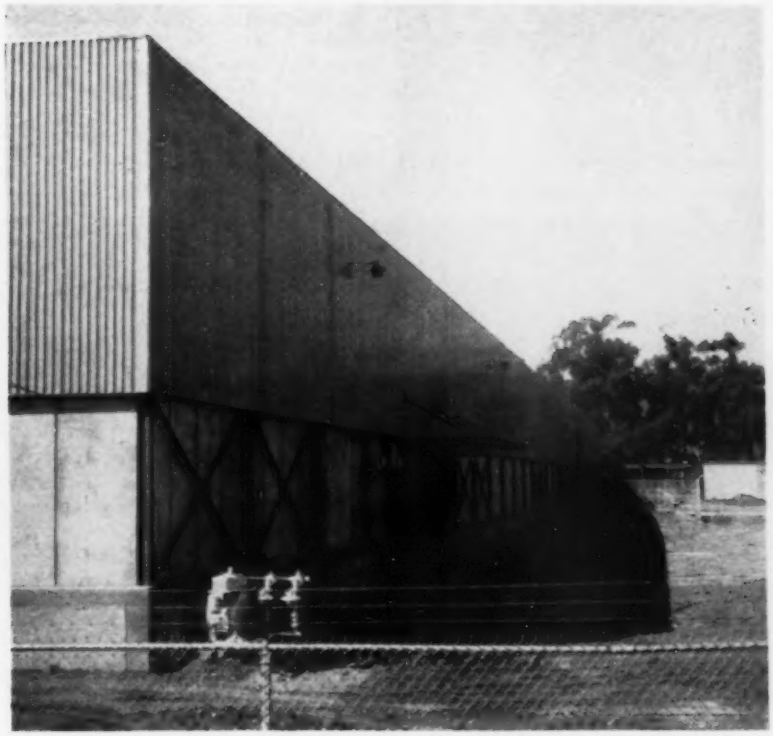
HOW TO MAKE PROFITS—Hotpoint and Swift collaborated in bringing their PCPC (Professional Cookery Profit Clinic) to 685 restaurant owners, managers and cooks in Portland and Salem. The clinic, demonstrating how meat can be purchased, portioned, prepared and sold at a profit, was sponsored by Pacific Power & Light and Portland General Electric. Sessions were conducted by George Klopp, Hotpoint, and Dean McBride, Swift, assisted by Herb Brackendorf of Dohrmann Commercial Co., Spokane. Jerry Collins, PGE, and Ralph Johnson, PP&L, were hosts



Pulling 750-mcm cables from power panel to transformer pad outside. Welding sets are supplied from 480-v distribution too

Channel doubles as fixture support and

Raceway for 480/277v

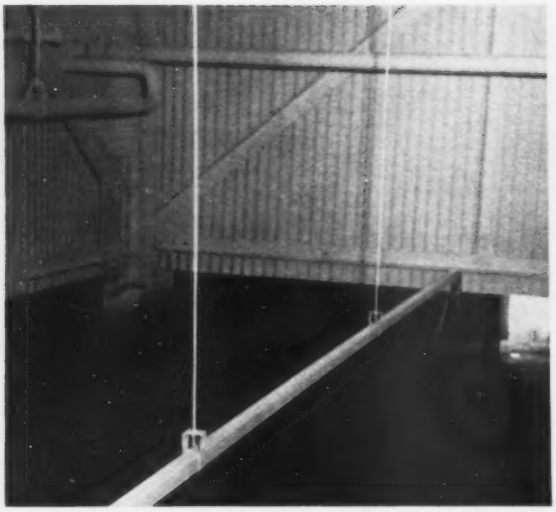


Transformer pad outside near center of plant building. Note mercury yard floods

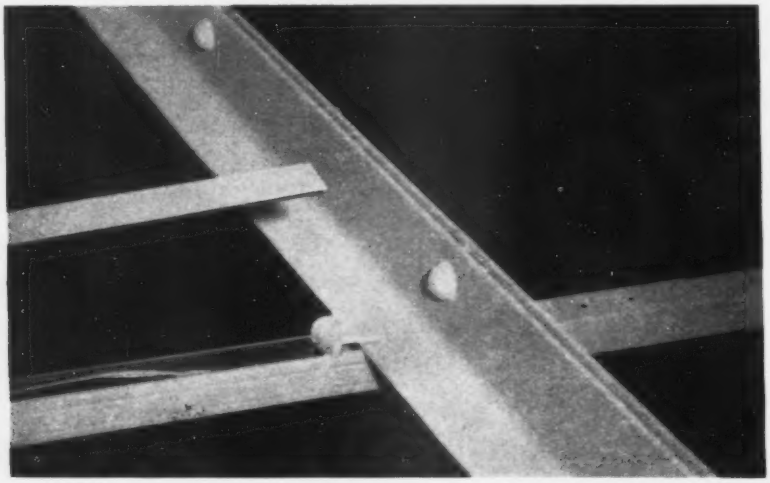
Double duty was given to the steel channel used by Ochs Electric Co. to support the 8-ft slimline lighting fixtures in the new plant of General Fireproofing Co. in San Luis Obispo, Calif. Ken Higuera, electrical engineer of Albert C. Martin Co., architect and engineer, designed the 480Y/277-v wiring system to use the new ITECO channel recently listed by Underwriters' Laboratories for use as a metal raceway and support for fluorescent fixtures. It was perhaps the first use of it for a 480Y/277-v system to carry both circuit and switch leg wiring. With such dual use and the ease of installation, the higher first cost of the materials was more than compensated. It also provides raceway capacity and adequate support for future doubling of the lighting.

Channel was mounted 20-ft from the floor on 5-ft rods secured to the purlins on a 6-ft, 9-in. spacing. Rods had the top half of an ingenious snap lock hanger on them when secured. The channel in 20-ft lengths was assembled on the floor, lifted to the hangers and snapped in place. Color-coded wire for circuits and switch legs was laid out on the floor beneath each row of channel, then lifted up and laid in the channel. The cover was later snapped on after connections to the fixtures had been made. Fixtures also were laid out in line, equipped with half of the snap lock hanger, lifted in place, snapped securely and connected to the channel knock-out by means of a chase nipple.

All switching is done at circuit breaker panels at the floor. To facilitate tracing of circuits each was taped together in the channel. Night-



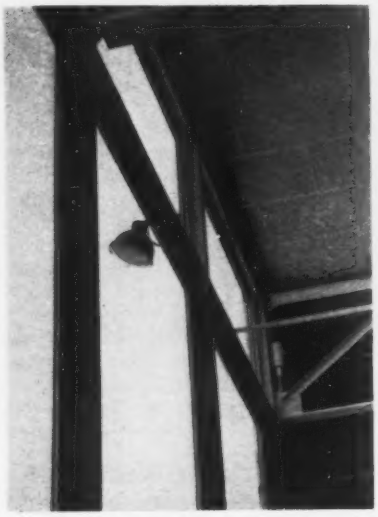
Rods to snap-on clamps support combined raceway channel. Fittings shown above. Channel has knockouts, also snap-on cover



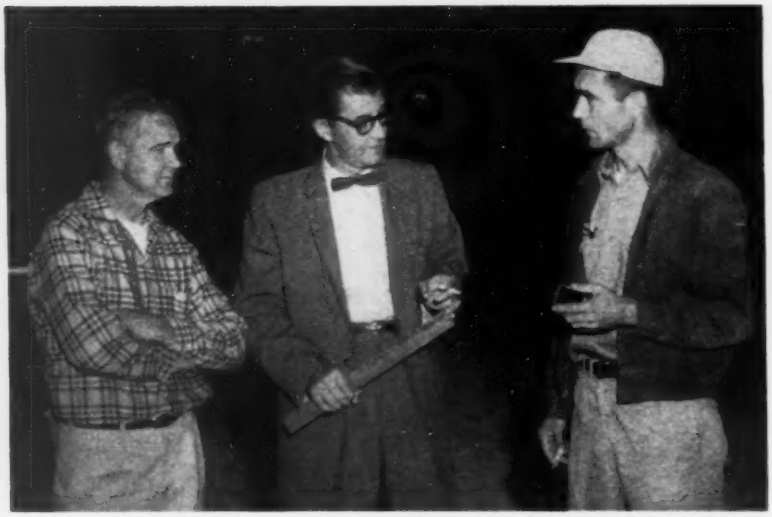
Channel held to steel beam by clamp. Wires in channel covered by snap cover

light circuits are also carried in channel. Some of it is used only for making up mechanical support for panels or transformers.

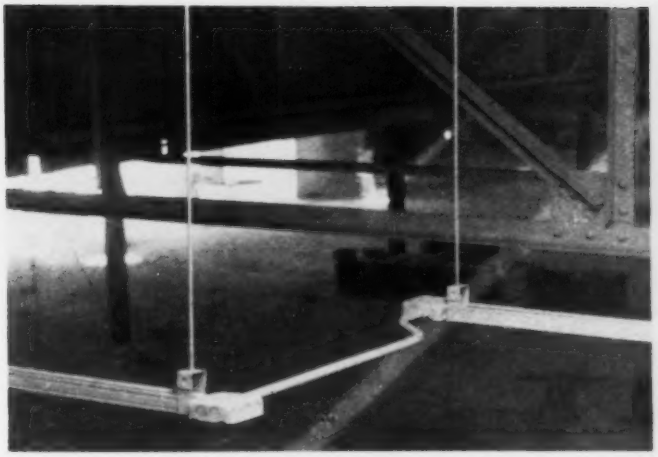
The block-long plant receives power at 12 kv brought underground in concrete duct to a transformer pad on which are mounted 833 kva of single-phase transformers for 480-v power. For lighting are 1,000 kva in three-phase, 12 kv/480 v oil-filled transformers. Nonmetallic duct was run underground from the transformer pad to pull boxes in the plant for the 750-mcm cables from outdoor switchgear to inside panel locations. Runs from panels to subpanels were all in conduit in the floor slab. Conduit was run on the surface of the tilt slab precast



Mercury yard floodlight outside with its ballast mounted on beam just inside

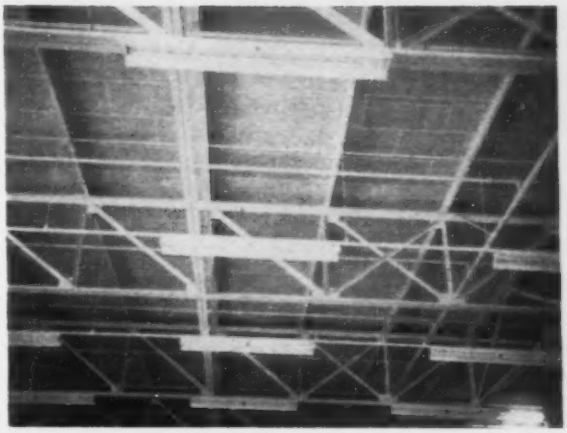


Arthur Ochs, electrical contractor, with Robert Ellis of ITECO who explains channel; Rom Cerruti, foreman, developed methods for this first time job

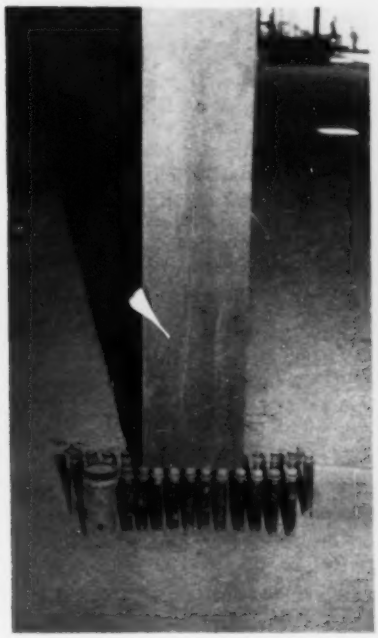


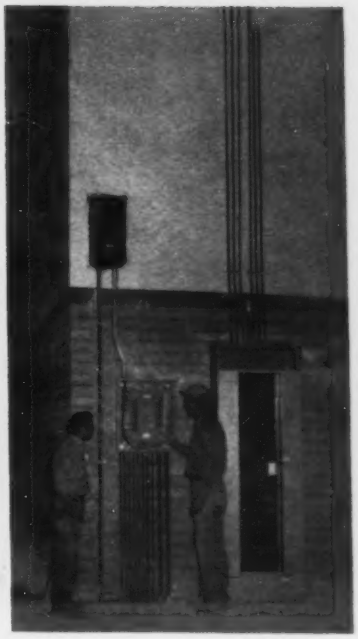
Square boxes with short bend of conduit connects two runs of channel that are offset. Similar method shown above at right where the channel over a craneway is at a higher level than that over another area. Conduit from panel is terminated in a similar manner to a pullbox fastened to the end of channel

Finished installation pictured at right: Lighting fixtures fastened directly to the channel and fed through a knockout into the fixture ballast raceway. Spaced about 9 ft apart, room is provided for doubling the lighting by mounting fixtures in between those already there. Mounting channel has sufficient raceway capacity for future switch and circuit wiring

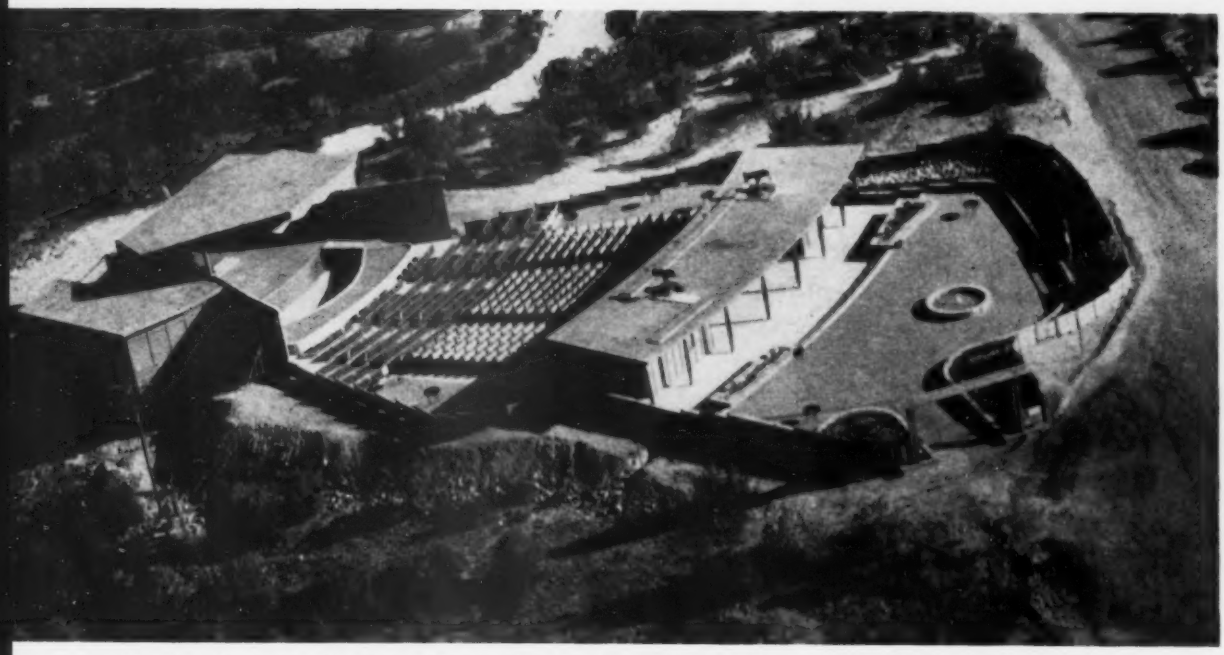


walls to the lighting channels and fans, heaters, ballasts or other equipment in the ceiling areas. Underground runs were also made to the separate office building and parking lot.





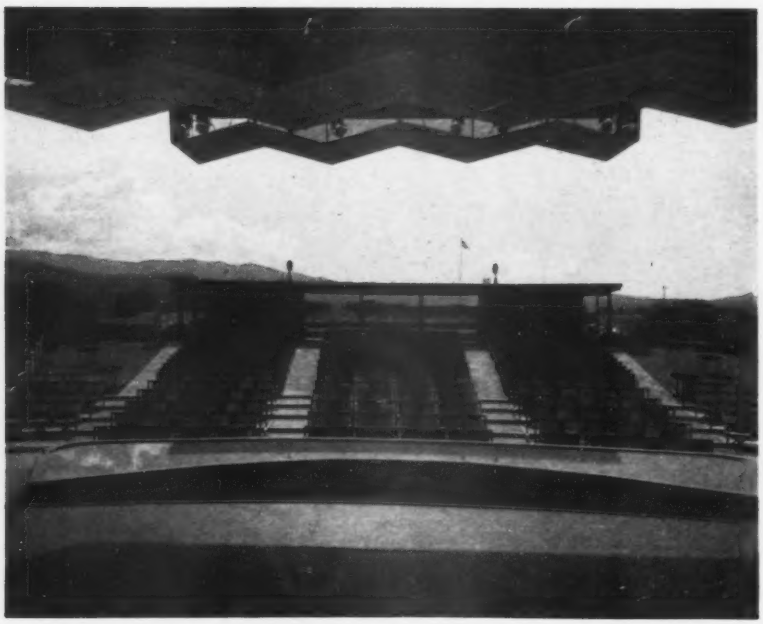
Exact placing of conduit stubs for panelboard by template made installation quick. Dry-type transformer for 115-v above panel



Air view shows covered stage, orchestra pit, reflecting pool and audience section at left; follow-spots on the roof

Engineered lighting for

Santa Fe's Outdoor Opera



Viewed from loggia, the stage canopy with its baffles also has four recessed spots to light the reflecting pool between acts, before and after opera

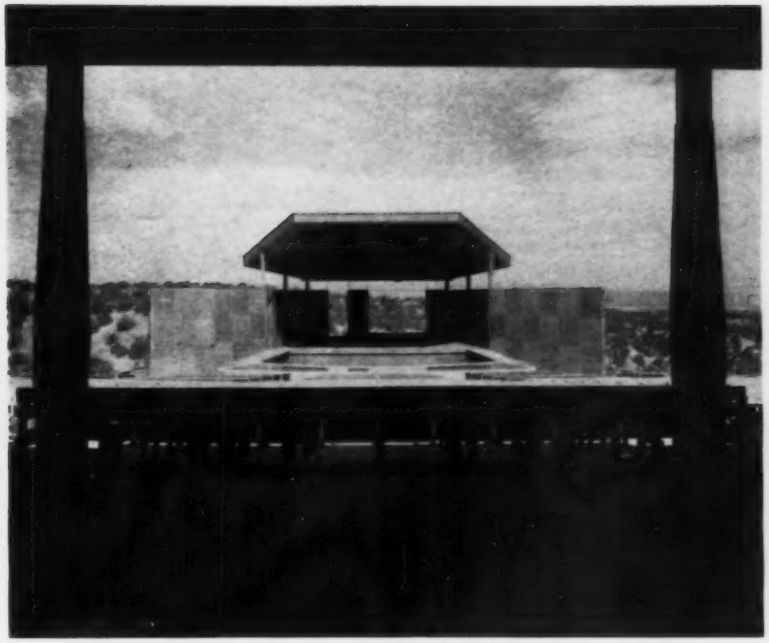
Carl R. Albach

Consulting Electrical Engineer
Santa Fe, N. M.

"Opera on the Ranch" was the way one national weekly magazine described the new open-air Opera Pavilion located in the pinon-studded hills about five miles north of Santa Fe, N. M.

John Crosby, who was assistant director of the Opera Workshop at Columbia University and who gave up that position last year to move to New Mexico, conceived the idea of such an opera amphitheater. He felt that opera singers as well as the American public should not have to go to Europe during the summer to participate in or to listen to good operatic music. As general manager of the Santa Fe Opera Assn., he got his friends to put up the necessary funds and selected the "rainless, mosquitoless, airplaneless" 76-acre San Juan ranch for the site of the pavillion.

The architects in designing the auditorium selected a point approxi-



From the stage—overhead lights above sound baffles; stage apron, orchestra pit and reflecting pool below; follow-spots on roof of loggia building at rear. Remote control dimmer console is in the building at the right rear

mately 60 ft behind the rear of the stage as the radius point for each row of seats so that each seat is focused on the same spot.

The stage has been described as "a take-off on the old-fashioned hand-operated phonograph-type loud speaker." The roof slants upward, while the wings slant outward. A reflecting pool, located between the orchestra pit and the seating area, "bounces" the sound toward the audience. The three rows of specially designed baffles at the ceiling serve three purposes: to help direct the sound outward, to provide a type of "feed-back" to the singers of orchestral music and their own voices, and to mask the many stage flood and spot lights.

The auditorium was designed to seat 480 people, with provisions for increasing that number to 750 without any drastic alterations. This is being done for the 1958 season, which will run from June 25 to Aug. 19. The stage sides of the two small buildings at the front have been coated with sound-absorbent material to eliminate echoes, and a bubbling fountain in the sunken garden at the entrance was built to mask the sound of the cars and trucks on the four-lane highway just over the hill beyond the parking area. Underwater colored lights are expected to be added to the fountain later.

The sliding panels at the rear of the stage are adjustable to the requirements of each performance, or may be left at the sides to form a "picture window" for the Jemez Mountains to the west.

The massive charcoal braziers along the sides and at the front are not for picnic lunches, but to provide some warmth for the rather cool August evenings in Santa Fe's 7,000-ft elevation.

Strange as it may seem, the pavilion was sold out so often that ten extra performances had to be provided during its first summer season. The 1958 season will have a repertory of eight operas, two of them world premieres of new works, and four symphony and six chamber music events.

A two-wire, 7,200-v primary line brings electricity to a pad-mounted transformer located at the south side of the pavilion. Here the voltage is stepped down to 120/240-v, single-phase, three-wire secondary. Three separate underground services carry the current into the building; one for the general lighting in the stage location, one for the stage lighting and one for the general lighting in the front area. The transformer pad is arranged so that with a little additional work it can be enlarged to house three transformers, one for each of the underground services.

General lighting is provided in the office and rest room buildings. The front is lighted with small recessed fixtures in the walls of the steps, garden and entrances. Stub-outs have been provided for future fountain and parking lighting. Four lighting fixtures are recessed at the front of the stage ceiling to provide reflected light from the pool before and after performances and during the intermissions.

Three plug-in wireways were mounted behind the three sound baffles over the stage for plug-in stage lighting. Wiring is brought down to a plug-in panel in the left wing and in turn wired to an electronic dimmer board located below the stage. The dimmer board has an ultimate capacity of 100 kw and is controlled at a low-voltage console mounted in the front office, from which point the operator has a full view of the stage. Three outlets were provided in the roof over the entrance for long-distance portable spot lights. A plug-in strap was also provided along the front wall of the orchestra pit for music stand lighting.

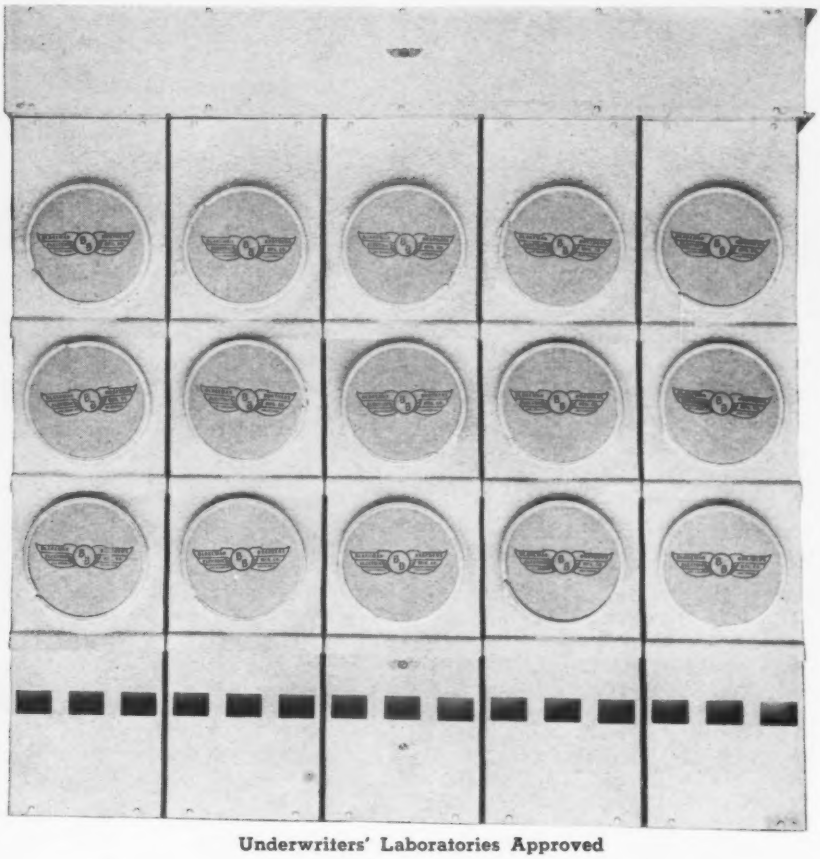
Because there is no curtain at the front of the stage, the remote control blackout feature of the dimmer board is used for encores and other stage scene changes.

The structure was designed by the architectural firm of McHugh and Hooker and built by Modern Construction Co. The mechanical consultant was J. L. Breese and Associates, the electrical consultant was Carl R. Albach and the electrical contractor was Modern Electrical Co., all of Santa Fe. The sound consultants were of the well-known acoustical engineering firm of Bolt, Beranek and Newman, Cambridge, Mass.

Governor Will See Better

Ornate Victorian-style fixtures in Iolani Palace, once the bed chamber of Hawaiian kings, now the office of the governor of the territory, were removed recently and put in storage. More modern fluorescent fixtures were installed for the governor to see by while he occupies the quarters. Later a new Hawaiian state office building is planned, after which the building will be restored as a museum of the monarchy in Hawaii. Then the original ornate luminaires will be reinstalled. They were installed about 1900.

THE LINE WITH THE GOLDEN TOUCH



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VERSATILITY—meter sockets and breakers in common enclosures, a factory assembled and pre-wired, raintight and indoor construction, meter enclosures two or three high, 15 Amp to 100 Amp breakers, plug-in Federal breakers 15 Amp to 70 Amp, 100 Amp to 600 Amp service gutter, unlimited number of meter enclosures and length of service gutter possible in one assembly.

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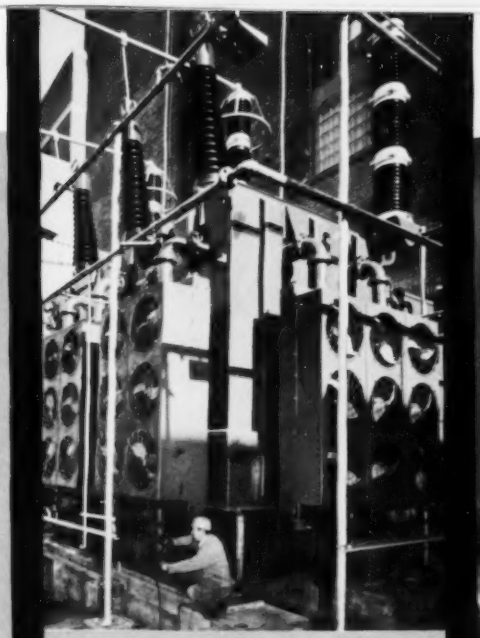


Two-step reduction in power transformer insulation levels has been proved in service and recommended as sound engineering practice. Rapid advances in lightning arrester design and improved performance in recent years are largely responsible for this development. The result has been a Westinghouse transformer offering the electric utility industry major investment and operating savings.

Mr. C. W. Miller, Manager, Power Transformer Engineering, and Mr. A. M. Opsahl, Lightning Arrester Designer and Development Engineer, discuss the parallel development of improved arresters and balanced insulation of transformers.

LOWER INSULATION LEVELS

Now save utilities up to 30% on power transformer original costs alone

. . . ANOTHER EXAMPLE OF PRODUCT IMPROVEMENT

FROM PLOWBACK OF EARNINGS INTO RESEARCH

YOU CAN BE SURE...IF IT'S Westinghouse

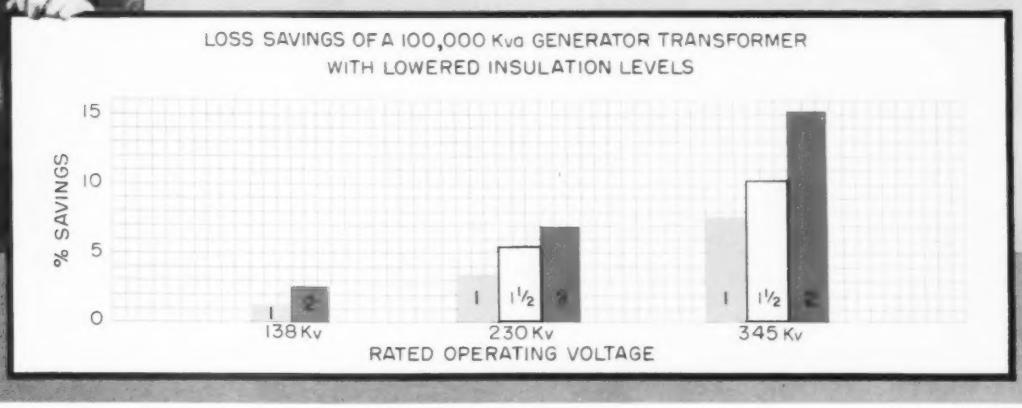
DEVELOPED THROUGH WESTINGHOUSE PLOWBACK INTO RESEARCH . . .

Lower insulation levels slash utility power transformer original investment and operating costs!

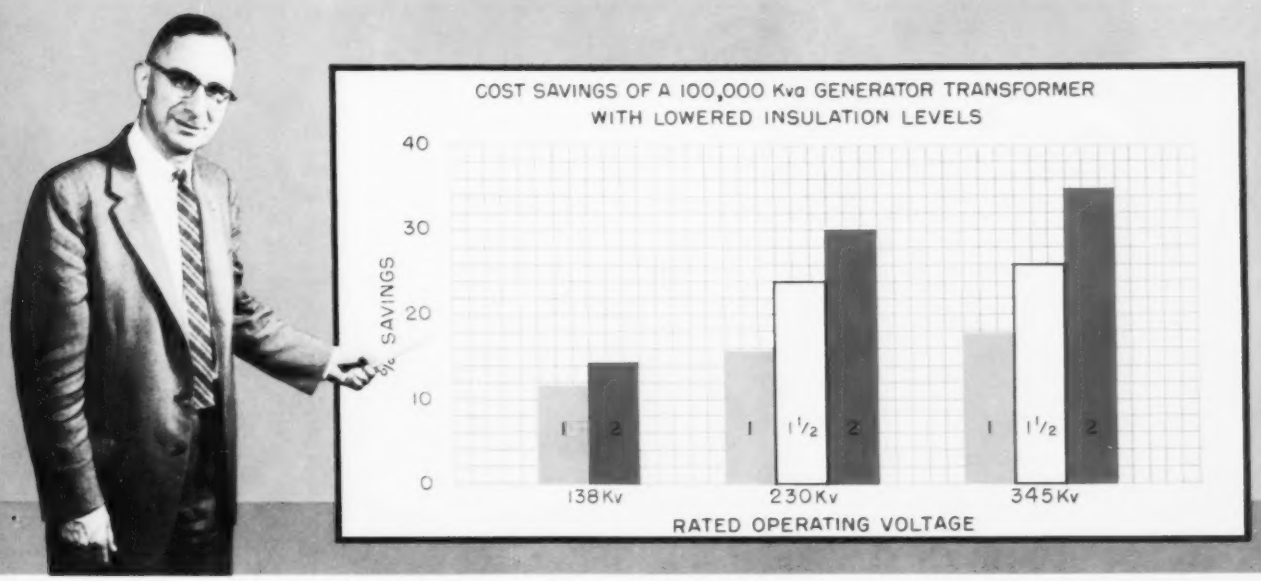
● These are the results of continuing research and development by Westinghouse since the first use of a lower-than-standard insulation level in the early 1920's. Power transformers with still lower levels of insulation now reduce utilities' cost four ways. This four-way saving with Westinghouse transformers—in lower equipment costs, reduced losses, lower impedance and reduced size and weight—has been proved for at least five years in actual service, as well as in decades of development and experimental work. This development raises considerably the practical limits of large blocks of power . . . is an outstanding example of a design with room to grow for tomorrow's growing loads.

This is another in a multitude of Westinghouse achievements made possible by plowing back profits into research and development—practical achievements that work hand-in-hand with the electric utility industry to help keep electricity America's biggest bargain.

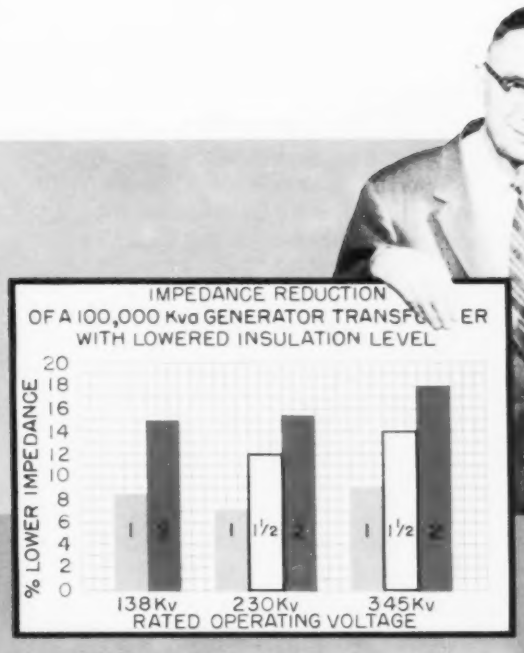
YOU CAN BE SURE...IF IT'S Westinghouse

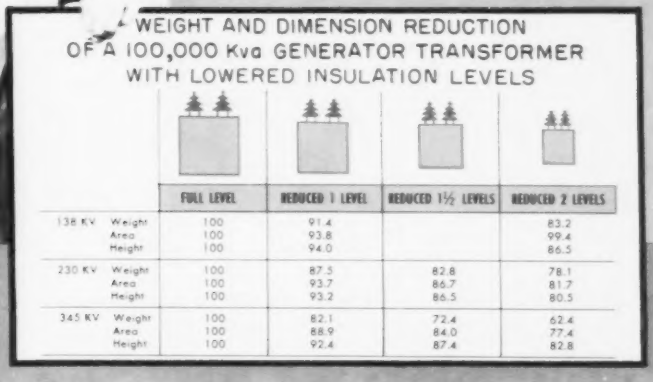


Reduced kw Losses . . . Over 7%—A large transformer has losses of as much as 1000 kw. In this area, too, Mr. Miller points out what the savings of lower insulation level can mean. The chart shows that 2-step reduction of insulation on this transformer cuts losses 7% or 42 kw. This amounts to a saving of $10,000 to $15,000 in loss evaluation.



Lower Original Costs . . . Over 30%—Mr. Miller illustrates the considerable saving in original equipment cost when transformer insulation levels are lowered. Note that the saving effected is approximately equal to the amount of reduction of the insulation level. For example, in a 230-kv transformer, a 1-step reduction means a saving of 17%, a 1½-step reduction saves 25% and a 2-step reduction saves 30% on the cost of a transformer with full-level insulation.

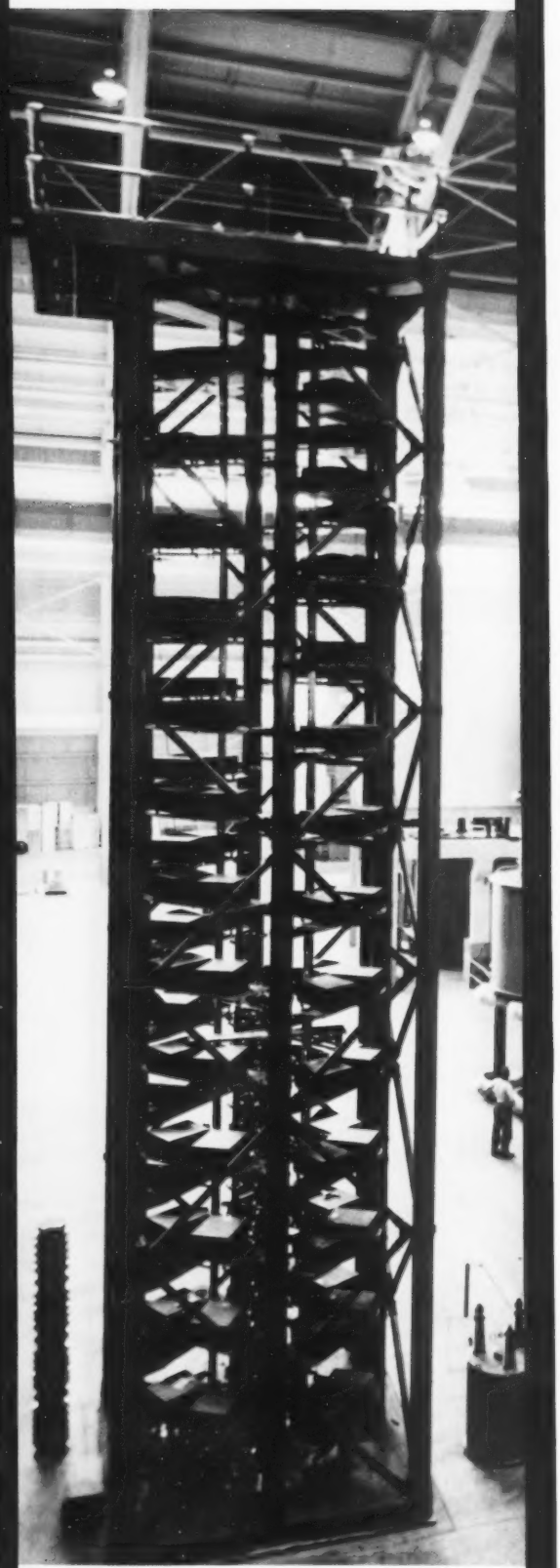




		FULL LEVEL	REDUCED 1 LEVEL	REDUCED 1½ LEVELS	REDUCED 2 LEVELS
138 KV	Weight	100	91.4		83.2
	Area	100	93.8		99.4
	Height	100	94.0		86.5
230 KV	Weight	100	87.5	82.8	78.1
	Area	100	93.7	86.7	81.7
	Height	100	93.2	86.5	80.5
345 KV	Weight	100	82.1	72.4	62.4
	Area	100	88.9	84.0	77.4
	Height	100	92.4	87.4	82.8

Lower Impedance . . . Over 15%—Lower insulation levels mean lower impedance, which results in further savings. A 2-step reduction in insulation level of a 230-kv transformer makes available 15% lower impedance, compared to a transformer with full level of insulation. Additional gains for utilities in the area of operating economy are realized in better system stability and voltage regulation.

Reduced Size and Weight . . . Up to 70,000 Lbs on a 100,000-kva 230-kv Transformer—The fourth major money-saving advantage of transformers with reduced insulation levels is found in their smaller sizes and weights. This means thousands of dollars saved on installation. Reduced transformer height permits reduced station structure heights; smaller size and weight permit savings in pad costs. As the demand for transformers of greater capacities grows, lower insulation levels will permit higher rated transformers to be built and shipped in one piece.



HERE IS HOW A POLICY

OF CONTINUOUS REINVESTMENT IN

WESTINGHOUSE RESEARCH

AND ENGINEERING

proves lower insulation levels practical and safe

WESTINGHOUSE TRANSFORMERS

NOW SERVING EFFICIENTLY AND SAFELY

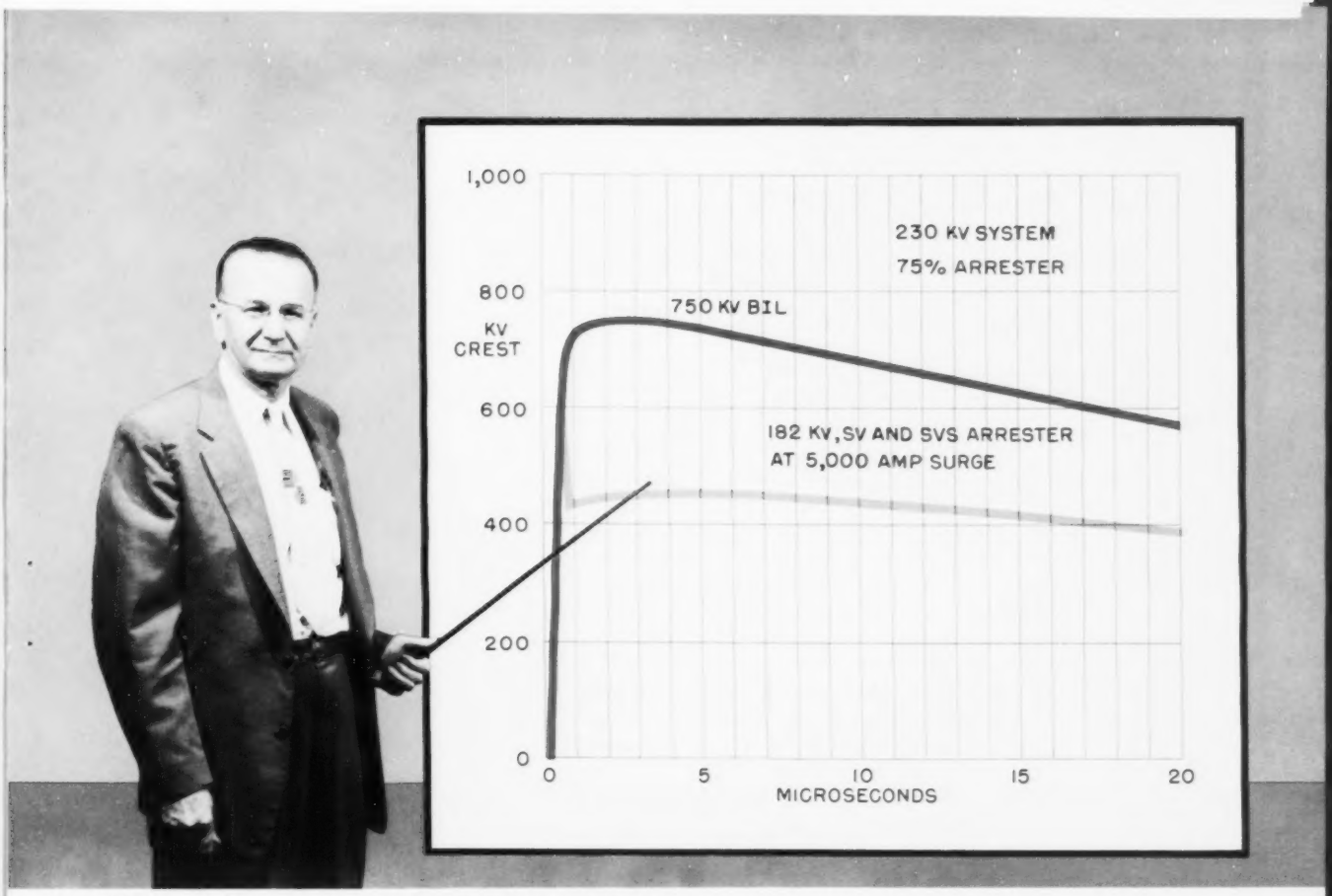
WITH BALANCED INSULATION

● Since lower insulation levels were first applied to Westinghouse Power Transformers in the early 1920's, the industry has moved steadily toward 2-step reduction. Graded insulation on transformers for grounded neutral service has been in use for many years. With the development of 345-kv systems, insulation was reduced 1½ steps; this reduction was then extended to 230-kv systems.

Westinghouse developments have contributed heavily to this trend toward lowered insulation levels. One such development was the improved SV lightning arrester, with discharge voltage reduced more than 20% over a period of years. This drop permitted protection of insulation lowered another level, without further reducing arrester ratings.

Another big stride in the development of transformers with lowered insulation levels was improved ability to withstand impulse voltages. Impulse testing of transformers, introduced by Westinghouse in the early 1930's, contributed greatly toward increased impulse strength, raising it to its present level. Impulse testing proves that transformers actually have the strength their design calls for.

5,200,000-volt surge generator at the Transformer Division new Test Center.



Mr. Opsahl shows the adequate margin of protection provided by the arrester for a 230-kv transformer with insulation reduced two steps. Similar margins of protection are assured for voltages of 138 kv through 345 kv.

Experimental work, carried out by Westinghouse in cooperation with utilities, has also contributed heavily in the trend toward 2-step reduction of insulation. Notable among these was the work at Tidd Station which resulted in 1½-step reduction in hundreds of transformers now in service throughout the country.

The results of this experimental work in the field and in Westinghouse laboratories have proved that 2-step reduction—properly designed and properly applied and protected—will give fully satisfactory service.

Impulse testing . . . your guarantee transformers have their designed strength, and more

Impulse tests on transformers are made with a 1.5 x 40 microsecond wave. The wave shape closely resembles the voltage across the arrester during discharge. Steps of test voltage establish the standard basic impulse insulation levels (B I L) which are commonly associated with circuit voltages as the full insulation level. Lowered levels of insulation have been used in higher circuit voltages where system neutral grounding permits the use of reduced rating.

YOU CAN BE SURE...IF IT'S Westinghouse

Improved lightning arresters make 2-step reduction in insulation a practical reality!

NEW LOW-IN-HEIGHT, HIGH-IN-PERFORMANCE ARRESTERS PROVIDE

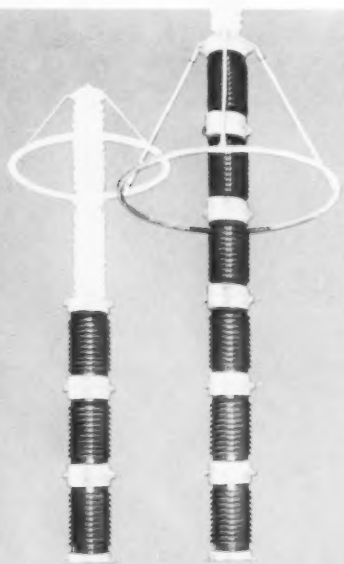
GREATER PROTECTION IN LESS INSTALLED SPACE

NEW AUTOVALVE ARRESTER BLOCKS REDUCE ARRESTER DISCHARGE VOLTAGE BY 20%

Better performance of the modern Westinghouse station arrester is due in a large degree to the improved Autovalve arrester blocks and rigid quality control to which they are subjected. Each block is surge-tested under simulated service conditions far more severe than standards require.

YOU CAN BE SURE...IF IT'S Westinghouse

Surge Testing of Autovalve Blocks—Tests shown here check the ability of the arrester elements to protect equipment. The surge takes place behind the screen to the right. Volt-ampere characteristics of each block are checked on the oscilloscope.



Height of Arresters Reduced 45%—Faced with the problem of increased operating requirements in less space, Westinghouse reduced lightning arrester height by almost one-half—with the same ratings. This was accomplished by physically paralleling the elements, keeping them in series electrically. These new Westinghouse SVS arresters require no supporting structure—a 20,000-pound-foot cantilever rating makes them entirely self-supporting. Installation is easier, faster, less costly . . . and the arrester now can be located closer to the transformer, physically, or directly on the transformer, providing better overall protection.

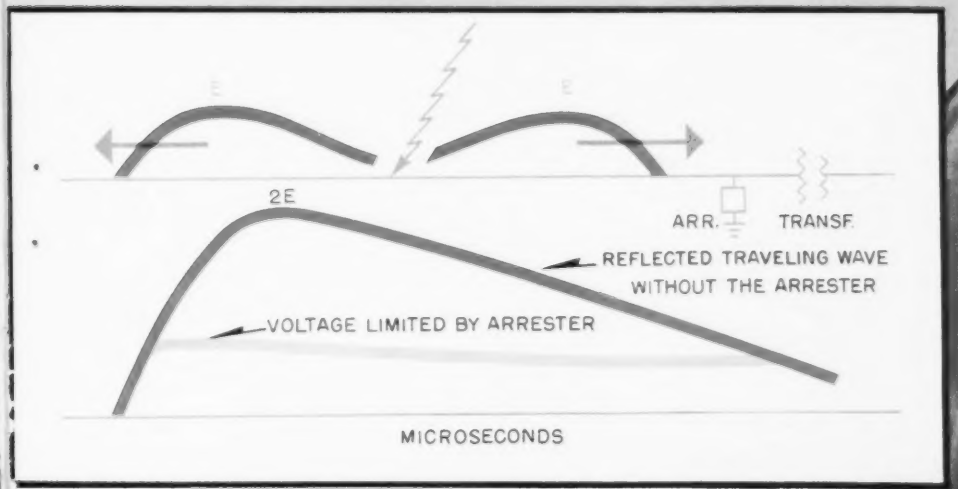
Arc Twisting Stops Arrester Electrode Pitting—New Mobilarc gaps, utilizing ceramic permanent magnets, spin the arc over the electrode, eliminating pitting and other electrode damage. Further, there is no discernible change in gap characteristics—even after as many as 1200 test operations.

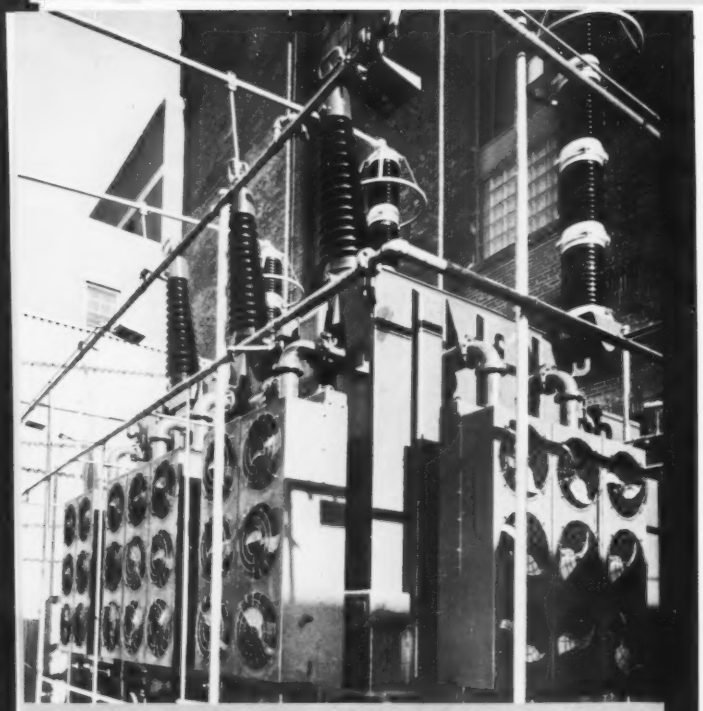
Self-supporting SVS arresters, with height reduced 45%, mount directly on power transformers rated up to 345 kv.

CONTINUING REDUCTION OF ARRESTER SURGE DISCHARGE VOLTAGES

Lightning surge voltages, above the transformer insulation level, travel along transmission lines to the transformer station. However, at the lightning arrester, this surge voltage is sharply reduced by the action of the arrester in discharging surge current from the line. Thus, the surge voltage across the arrester during surge discharge is decreased below the level of the transformer insulation, protecting the transformer from damage. Improvements in lightning arresters over the years have lowered the sparkover and discharge voltages, making possible the reduction of insulation from full level. Present arrester protection makes practical 2-step reduction where system neutral grounding permits the use of arresters rated 75% of circuit voltage.

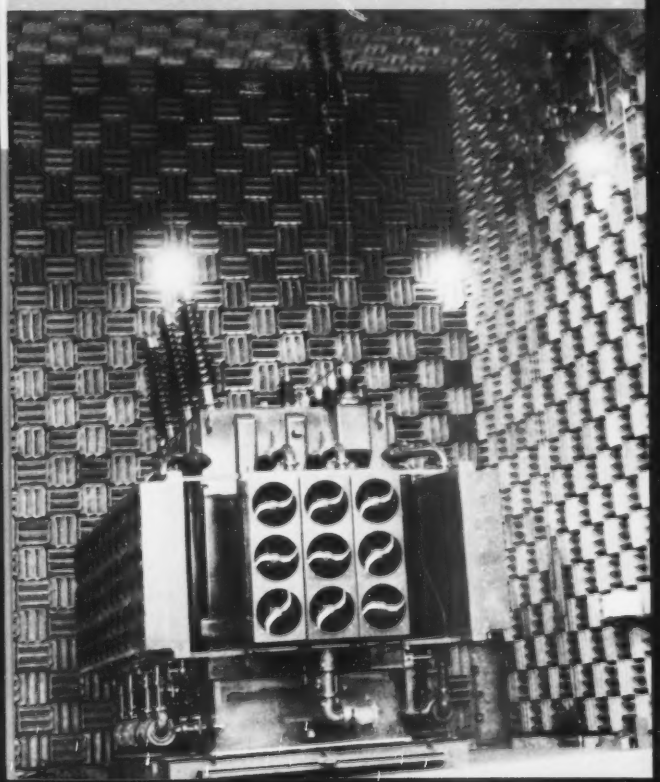
When lightning strikes, the surge voltage (E) travels the line in both directions from the struck point. At the transformer, the voltage could double to 2E. The lower wave shows the effect of the arrester **on the surge voltage, limiting it to a voltage below the insulation level of the transformer.**





This 240,000-kv FOA generator step-up transformer is installed at Niagara Mohawk Power Corporation's Huntley Station. Use of lower insulation levels made possible one-piece shipment of this 825-kv BIL transformer.

The Sharon Sound Laboratory is an integral part of the giant Westinghouse Test Center at the Transformer Division. It is in this test center where much of the research on lower insulation levels is conducted. Here, a half-million-pound giant is checked out before shipment.



Plowback into research and engineering at Westinghouse goes hand-in-hand with industry progress

Westinghouse has pioneered, field-tested, produced and recommended as sound engineering practice lower insulation levels, because it is in the best interests of the industry. The proof is in the savings—up to 35% in transformer cost, with additional installation and operating savings, plus a gain in operating efficiency.

Ask your Westinghouse representative to explain how the advantages of lower insulation levels can go to work for you.

CP-1043

YOU CAN BE SURE...IF IT'S Westinghouse

WATERTIGHT!

Another fine product!

Underfloor Duct by

ORANGEBURG®

For Distribution of Electrical Wiring in Commercial, Industrial and Institutional Buildings

Since 1921 Non-Metallic Underfloor Duct by Orangeburg has been selected for many of the country's outstanding buildings because of its safety, flexibility and low installed-cost. To learn how an Orangeburg Underfloor Duct System keeps a building *electrically* modern for its lifetime, write for Catalog 201.

Orangeburg Fibre Conduit Prolongs Cable Life

Keep out corrosive ground waters, and you prolong the life of underground cables, say utility engineers!

Why? Because ground waters containing corrosive elements derived from the soil and concrete encasement attack cable sheath and shorten cable life. Orangeburg's impermeable wall and self-sealing Taper-Sleeve Joint shed them *"like water off a duck's back."* You get maximum protection with Orangeburg.

Orangeburg protects cables in many other ways. Smooth bore, low co-efficient of friction reduce incidence of abrasion. Its material is strong, tough, resilient, durable.

No other conduit is easier to install

Light, 8-foot lengths and a complete line of bends and fittings speed installation. Taper-Sleeve Joints tap water-tight in a jiffy. Orangeburg lays faster and at lower cost than any other type of conduit.

Orangeburg Fibre Conduit has prolonged cable life at minimum expense for utilities, municipalities and industry since 1893.

Distributed by Graybar Electric Company and by General Electric Supply Company. Branches and stocks in principal cities.

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ORANGEBURG MANUFACTURING CO., INC., Orangeburg, N. Y. **West Coast Plant, Newark, Calif.**

ORANGEBURG®
FIBRE CONDUIT

New Higher Ratings make...

COMPARE THE COST figures on the chart above and see how the application of ML-32 single-phase regulators can reduce substation regulation cost by as much as 60% compared to other types of regulation.

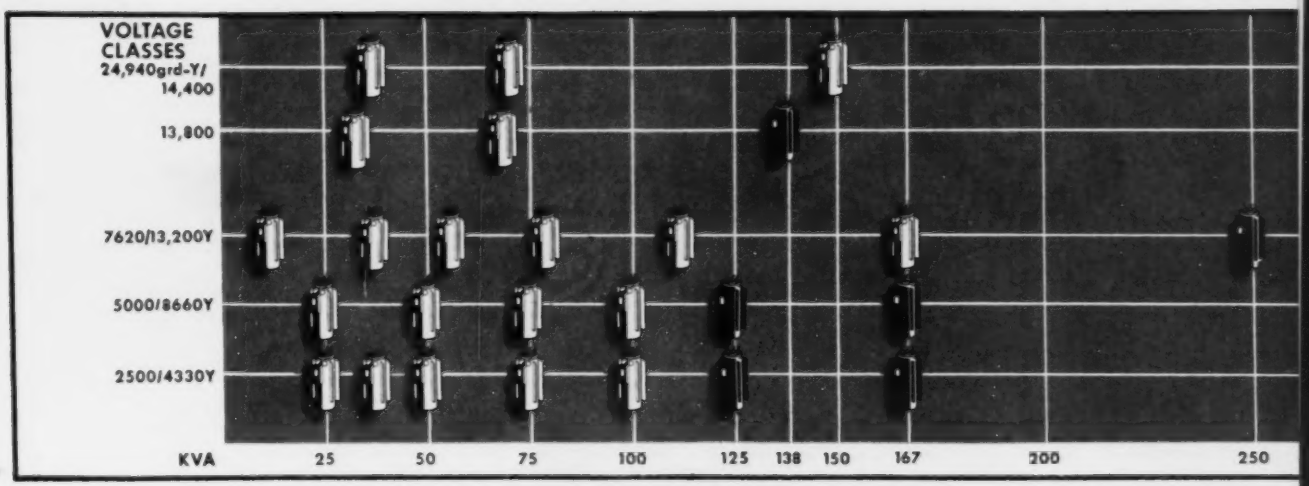
New ratings of G-E single-phase step regulators permit application of ML32's in larger substations . . . Save up to 60% of the cost of station regulation equipment!

The trend is to greater use of low-cost single-phase regulators in substations, and General Electric is meeting the demand. The new extended single-phase step regulator line provides new 125- and 167-kva ratings in the 2500- and 5000-volt classes, a new 250-kva rating in the 7620-volt class, and a new 138-kva rating in the 13,800-volt class for greater substation economies. As much as 60% can be saved on your regulation investment, and you also get individual phase regulation and increased savings through deferred investment in line rebuilding.

In addition, at reduced regulation ranges, a new Load Bonus (extra current capacity) of ***480 amperes*** (up to 160% of rated current) is now available on 2500-volt units rated 75 and 100 kva.

Remember, the price of substation regulation, using ML-32's, is less than that of other types of regulation. You'll want to know more about the quality and economy available in the ML-32; write to Section 423-25, General Electric Company, Schenectady, N. Y., or contact your nearest General Electric Apparatus Sales Office.

General Electric Regulators Cost Less On The Line



THE EXTENSION OF ML-32 RATINGS to 250 kva (new ratings shown above in black) gives you a new opportunity to provide low-cost regulation on your growing feeders. Growing load, plus demands for economy, can be met when you specify ML-32's for your substation regulation. They cost you less on the line.

Progress Is Our Most Important Product

GENERAL ELECTRIC

President De Lamar Holt (of IEA) and Governor George D. Clyde (of Utah)

New IEA President Dell Holbrook

IEA Celebrates Electric Week

Utah's Governor George D. Clyde, himself an engineer, discussing the region's resources of water, coal, oil, gas and uranium, and V. D. Carver, manager of the Litton Industries' Salt Lake electronics plant, restored to the 200 or more who heard them at the Intermountain Electrical Assn. annual conference in Salt Lake City, Feb. 11, confidence in the business opportunities and future despite the present temporary and seasonal lull. With these two major addresses pointing up opportunities ahead came a review of the programs and organizational efforts to capitalize upon these trends.

Governor Clyde's address was no ordinary welcoming address from a political official. As civil engineer and former professor of engineering, he gave true appreciation to the part electricity plays in modern living and industry. Likewise, he realized that water power development could not take care of the entire needs foreseen in the future and he expressed the hope that private industry would continue to develop power from the coal, oil and uranium reserves in the area. The watersheds of the area, however, should be linked together into the grid to serve all of the people in the Intermountain region. "We are on the right track in the partnership program," he declared.

What the electronics industry means to Utah brought a new concept to the possibilities for industrial development and employment as Carver described it. Predicting a million population in Utah by 1965 and hence a need to create 40,000 jobs in manufacturing, Carver said that Utah was not strategically located to ship its products. However, products having a high technical content did not weigh much and were particularly adaptable to the area. As a technical company he said he would welcome other technical companies locating in the area. He suggested the need to advertise Utah more to such industries, zoning for location of prospective plants, development of more technical skills among the population and bringing to the attention of technical industries the colleges of the area for research contracts.

With these two featured addresses were many on the bread and butter of the business. Robert E. Ingmire, manager, interindustry activities for the Live Better Electrically project, presented the latest film and a summary of activities this year. The Medallion Home program is the central theme for major promotion coordinating the Housepower program and others for home lighting and appliances into a single package.

Speakers Fred Pierson, Wes Seabury of UARTS chapter and Hal Morr, of IAEI

R. R. Strachan, George Bogard, George E. Larsen, chairman and V. D. Carver

Dale Brown, 1 ft-candle, Edison's lamp

George T. Bogard, manager, utility relations, G-E's Appliance & Television Division, Louisville, paraded the future opportunities in the major appliance business, saying that the appliance and TV business had undergone a revolution and that today's retailers cannot depend on old customers for their livelihood. He declared that those who have changed over to promotional merchandising methods are those who are doing the business. Concentrating on fewer lines, buying in bigger quantities and getting faster turnover—a supermarket philosophy—depending more on national advertising and television to do the demonstration and specialty selling the job can be done. Concern over the service problem is being felt by the manufacturers who determined, he implied, to see that a solution is found if dealers cannot handle it. 1958, he said, will see the greatest drive to recruitment and training in the servicing of appliances. Possibility of factory service was implied.

A somewhat similar thought was presented at the evening banquet by Don Johnson, Hotpoint Co., Chicago. He related his company's program of decentralization and reorganization of sales and distribution. Deduction in the number of dealers from 11,800 to some 9,000 will be effected. The price structure will be revamped. Delivery will be facilitated, more factory direction, sales training and management counsel will be incorporated.

From the past president of the International Association of Electrical Inspectors, H. S. Morr, manager, Utah Fire Rating Bureau, came a description of how the National Electrical Code is developed by one of the most democratic of processes in American industry and regulation. In doing so he warned that if adequacy is wanted the code must not be looked to to provide it. It should be the result of the Live Better . . . Electrically and Housepower programs since the code at best is a minimum requirement and not an adequacy standard. The importance of the electrical inspector as a protector both of the public and of the good will of the industry was emphasized.

How the television service and repair men of Utah hope to meet their problems was discussed by Wesley Seabury, chairman of the IEA Servicemen's Chapter, and by Fred Pierson, the chapter vice-president. The newness of the television and its constant changing accompanied by a lack of trained people and lack of consumer education as to the difficulties involved have brought the business into public disrepute. To combat this and to attempt to get more ethics in advertising and business practices, train service people better and even offer preventive maintenance were among the things covered by the two speakers.

The conference was presided over by De Lamar Holt, Utah Power & Light Co., president of IEA, with individual sessions skillfully handled by Plato Kanell, Salt Lake City dealer, and George E. Larsen, Provo Public Utilities. Dale Brown, General Electric Lamp Division, was banquet mc. Donald R. Dyrenforth, G-E Lamp Division, and his Friendship Hour committee, provided a social event of elegance and dignity before the banquet.

Both the luncheon and the banquet were occasions for honoring members of the industry who had served it with distinction. At the luncheon President Holt presented certificates to past officers, Paul Ashworth, John Longden, J. R. Christensen, Ken Taylor, A. R. Woolley, William Mott, Lennox Murdoch, Homer Peterson, Richard Bennett, Leo Hansen and Robert Gillman. The Salt Lake Retail Chapter, with Sherman Anderson as chairman, also presented certificates to Plato Kanell, Ruel Harrington, Alvin Soderberg and Matt Holt. Holt was elected chairman for 1958.

New officers of the Intermountain association were also installed. Dell R. Holbrook, Union Furniture Co., Bountiful, was made president when J. R. Christensen, manufacturers' agent, declined on account of health. James D. Stevens, manufacturers' agent, was named vice-president. Secretary-treasurer is Dell Leeson, KDYL Radio; past president, De Lamar Holt, Utah Power & Light Co.; and Robert O. Trottier, managing director.

At the banquet honorary life memberships were presented to Henry Eskuche, retired, formerly Western Supply Co.; George Earl, Utah Power & Light Co.; L. A. Herdti, Ogden contractor; and Paul Ashworth, Telluride Power Co.

Program chairman Koch and President Toedtemeier

Speakers John Kimball and Dr. ElRoy Nelson

SRVEA Starts Biggest Year

When a governor, a utility manager, a banker and a college professor all talk like sales managers something is bound to move. And that was the impression the dynamic third annual conference of the Snake River Valley Electrical Assn., in Boise, Feb. 15, gave the more than 250 men and women who came from all parts of southern Idaho to participate and recharge their batteries of ambition and enthusiasm for 1958. It was a fitting climax to National Electrical Week and an auspicious beginning for a selling spring after a mild winter.

Governor Robert E. Smylie of Idaho, familiar with the electrical industry through his help to it in administering the Idaho electrical inspection law when he was attorney general, keynoted the compact one-day conference. Attitude of mind, he said, made all the difference whether running a state or a business. He enumerated Idaho's industrial developments since 1955, brought about by selling the state and its resources. He told what the tourist business meant in income to the state. He noted the improved markets for Idaho farm products and that a turn had been made in employment statistics since November.

John T. Kimball, vice-president and general manager of free enterprise champion Idaho Power Co. praised all of the industry for proving that people competing strongly against each other could work together in their Snake River Valley Electrical Assn. so well. What his company and its men and women did in 1957 to help set the tone of the market he reviewed briefly as he pledged in 1958 still stronger support.

"If we wind up 1958 with a poor business year," he said, it will be because we have talked ourselves into it. Our business this year, all of us, is a matter of what we do about it to sell it." He reminded that both the refrigeration and the radio businesses had started in depression times—when people had no money, except to buy a refrigerator when it was *sold* to them.

Banker-economist Dr. ElRoy Nelson, First Security Corp., Salt Lake City, proved both a realist and optimist, spiced with humor. Kidding the industry for holding meetings in dark hotel rooms and running wires all over the floors, he went on to predict changes that are coming to the agricultural state with the new industries brought in by the missile program, phosphate plants, atomic energy plants, etc. Capital expenditures in Utah and Idaho will be greater in 1958 than 1957, he said. Money is again available. Within the past three weeks, he said, the insurance companies have rediscovered the West and have been buying up

New officers for 1958—R. Carl Young, treasurer; Harold Toedtemeier, past president; Paul Worthen, G-E Co. new president; James Bruce, secretary

all the mortgages in the hands of the banks, leaving the latter with plenty of lending money.

Noting an upturn in residential construction in January he pointed to a rich market opportunity in home rewiring and repairs not yet being sold. "Are you going to be satisfied that only 2% of the homes in these states are air conditioned?" he asked to direct attention to this market.

Another chapter of the association is in the making in western Idaho and eastern Oregon, Harold W. Toedtemeier, KIDO-TV, president of SRVEA, reported in summing the year's activities. During 1957 the association had extended its home show, Parade of Homes, Housepower, safety contest and dryer promotion to all three of its chapters with fine results. That full advantage be taken of the national programs such as Medallion Homes (Idaho had the first in the USA) and Housepower was his recommendation to his successor as the aim for 1958.

Never was psychology taught more entertainingly than the way the featured star of the entire conference, Dr. G. Herbert True, did it after the noon luncheon, (augmented by 50 or more from the business community.) "Creativity in Sales," he billed it, not academic psychology, but this Marlon Brando of marketing, (assistant professor of marketing, Notre Dame University, South Bend) recreated honor in selling as a profession and inspired his audience to dedicate themselves completely to selling.

More salesmen become presidents of companies, they make more money than any other group, they make more jobs for other people and the profession is depression proof, he proved to all. The tighter the economy, he showed, the more they are in demand. Admitting freely that nothing he told was new he certainly made it sparkle with new glamor by his surprises—magic tricks, blank pistol, cartoon slides, gags—all of which illustrated and emphasized his teaching (selling). After removing all the inhibitions one might have to striving—age, education, fear etc.—he concluded with, "You do not have the right to be mediocre."

Following such a human dynamo Paul Pehrson, furniture dealer of Sugarhouse, Salt Lake City, added his simple sincere testimony as to the long term value of really liking people—customers, competitors, employees and family—in building of sound and healthy business and meeting competition.

Lack of time caused Henry H. Falkner, Westinghouse Electric Supply Co., conference general chairman, to forego showing of a new Housepower film. The program of promotion for the year had likewise been omitted because Idaho Power Co. people headed by Al Gilbert, general sales manager, had recently completed a tour of the area to present it in detail.

W. L. Troy, manager of association activities, Live Better . . . Electrically project, New York, concluded the program with a review of business trends, trends in the industry and a platform of action for 1958 and beyond. How for the first time in history the total electrical industry has voluntarily joined to work on integrated national programs and how local leagues have taken up local sponsorship and given them action, was told.

A banquet and dance in the evening contained only the passing of the gavel to the new president, Paul W. Worthen, General Electric Co., Boise, by Harold Toedtemeier, as far as business was concerned. It followed a hospitality hour, for which Joe I. Wright, Afton-Lemp Electric Co., was chairman. H. P. Mills, Salt Lake Hardware Co., was banquet chairman. A skit, "My Shadow," was put on by a Pocatello group consisting of Max Stucki, Mrs. Dorin Parr, Mrs. Charles Jensen, and Gervase Arnold. Maynard Smith, Graybar Electric, was entertainment committee chairman. George Ganz, KIDO-TV, was mc.

Program chairman H. Ferd Koch, Electric Service Co., Boise, and immediate past president, conducted the sessions with dry humor and gracious introductions. M. M. Saville, G. E. Supply, handled the multiplicity of arrangements; R. C. Young and committee both finances and registration; W. R. Reed, Idaho Power, attendance. P. H. Furno, SRVEA manager and Vic Goertzen, acting manager for January, handled publicity and all the loose ends. Mrs. Maynard Smith as president of the "Live Wires," women's auxiliary, provided a fashion show and luncheon for the ladies.

Install New Officers

Other new officers elected were: Merritt Shotwell, Twin Falls, vice-president; James Bruce, Idaho Power Co., secretary; R. Carl Young, treasurer; P. H. Furno, secretary-manager. Chapter chairmen were: Ernest A. Fisher, Terry's Appliance, Boise, central chapter; Max Stucki, G-E Supply, Pocatello, eastern chapter; William Grange, Idaho Electric Co., Twin Falls, Magic Valley chapter.

Directors elected by divisions were: Dorin Parr, Parr Electric Co., Pocatello, and Herbert Heatherington, for the contractors division; William Lott, Lott Electric Co., Rupert, and Frank Ramey, Pocatello Electric, for the retailers division; Reed Goold, United Electronics Wholesale, and Dwight Zundel, Zundel Radio & Appliance for the electronics division; Howard Johns, Idaho Hardware & Plumbing Co. and Maynard Smith, Graybar Electric Co., distributors division; H. W. Christensen, General Electric Co. and Joe Divine, Westinghouse Electric Corp. manufacturers division; Byrle Carr, Riser-Cain Co., and Clarke Waters, Clarke & Waters Refrigeration Co., appliance repair division; A. I. Sawyer and W. R. Reed, of Idaho Power Co., the utility division.

"You do not have the right to be mediocre!"—Dr. Herbert True

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SPECIAL SERIES

How Research Shapes Our Future Prosperity

If you are looking for an industry that is going to keep on booming in 1958 and every year for the next decade, here it is. It is the industry of technological innovation through research and development.

Last year this great new industry spent over $7 billion to discover and develop new industrial products, processes and equipment. This year the preliminary McGraw-Hill survey indicates that total expenditures for industrial research and development will be even greater, perhaps as much as $8 billion. Of the companies surveyed, 57% plan to spend as much as in 1957 and 38% plan to spend more.

The sustained expansion in research and development is the best guarantee we have that the current decline in business investment in new plants and equipment will be relatively short-lived. There can be no prolonged decline in investment in an economy where technology is changing rapidly.

This editorial is designed to show how the continued surge in research and development can be expected to lead first to new products, and eventually to renewed expansion of investment in new industrial plants and equipment. Such expansion is the essence of national economic growth.

A Slow Start

The impact of research on sales and investment is still very gradual. Research spending itself has more than doubled in the last four years. But only 32% of all manufacturing firms report significant capital outlays to make new products. We are not reaping the full dividends of industrial research as yet for several reasons:

- Research expenditures were relatively small until the Korean War of 1950 brought substantial government contracts in aviation, electronic and related fields. Heavy research outlays for civilian and industrial products came even later.

- There is an average *lag*, according to research directors consulted by the McGraw-Hill Department of Economics, of roughly seven years from the start of research until the product is ready for large scale output — about five years of research and at least two years to solve production problems and develop markets.

- Complex products, such as new consumer durables and industrial machinery, have an even longer time lag.

However, new developments are certainly underway. Research began to increase in all lines of business when Korean War restrictions and

the excess profits tax came to an end in 1953. The tax revision of 1954 added a new incentive by making research outlays deductible as a current business expense. By 1955, the research boom was on.

When Is The Payoff?

With a lag of about seven years, it will be the early 1960s before these new developments become a dominant factor in capital investment. But once the flow of new products and new processes starts, it will accelerate sharply — just as research spending has accelerated in the past few years.

By 1960, over $50 billion in sales will be coming from products not on the market as recently as 1956. Sales of new products will increase year by year, but they will gain most in 1960-1962, or five years after the recent spurt in research expenditures.

Capital expenditures to manufacture new products will also rise, but with a slightly longer lag. Here the sharpest rise should come in 1962-1965, as the new products reach a volume that calls for a significant amount of new capacity. In most cases, initial output of new products will come from existing capacity.

This timing of a new wave in capital investment appears logical on other grounds. Population experts forecast an upsurge in marriages and births around 1965. So by 1962, industry will be starting to tool up for new mass markets.

The important point is this: As we approach the 1960s more and more sales and investment will be in new products growing out of research. By 1960 well over 10% of manufacturing sales will be in new products not on the market in 1956.

Meanwhile — research will help stabilize capital spending by raising the level of modernization and replacement expenditures. Of course, research does not eliminate all the ups and downs in the demand for capital goods, for there remain variations in the amount spent to expand capacity. But a high level of modernization, to cut costs and improve quality, does put a floor under any drop in investment.

What To Expect

During the next few years we can expect an increasing flow of new materials, new metallic alloys, new machinery — primarily those developments coming out of long-established research programs in the chemical and electrical industries. Industry will make wider use of specialized computers and automated equipment.

But the dramatic payoff on research comes even later. In the early 1960s the consumer goods industries will begin tooling up for their really new products — things so basically new they can change the way a family lives. Such items as plastic houses, paper apparel, turbine autos are under development right now. But it will take several years to get costs down and for population and incomes to grow to the point where mass markets are created.

When we reach that point in the mid-1960s, there will begin the greatest surge of capital investment in all history. And then — around 1965 — the new processes (full automation, atomic power, continuous steel casting) which are the slowest and most expensive part of the research chain to develop, will come into play.

The combined impact of new products and new processes, to meet an expanding market, will thus be felt in the mid-1960s — eight to ten years after the recent sharp increase in research spending. The full impact is that far away because of the lags for applied research, pilot plant studies and market introduction. But to a large degree the prosperity of the 1960s has already been shaped by the research programs now underway.

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Donald C. McGraw

PRESIDENT

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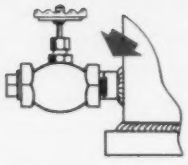
Handle inserted through two-inch opening in cover operates mechanism. Handle cannot be removed unless the tap changer is in a positive position.



Threaded valve connections

Connections are solder wiped for extra protection. Valves located for easy access. Globe-type valves with non-rotating seats close tight, avoid wear on valve seats.

Special design of bushing seal

Spiral-wound metallic gaskets actually adjust to changing operating conditions. Gaskets can be installed without grease or cement. May be re-used if necessary.

Flexibility in Choice—To simplify application problems, Allis-Chalmers network transformers are available in all three types — oil filled, *Chlorextol* liquid filled, and sealed dry type.

ALLIS-

Meeting Growing System Needs
...in city after city

Newark Grow!

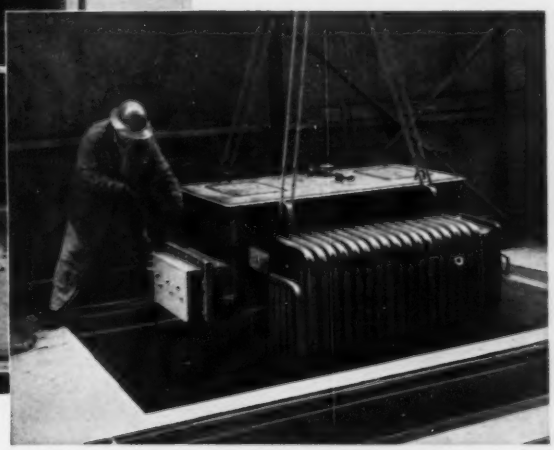
Symbolizing a wholesome optimism, reflected throughout America, is the new cloud-nudging Mutual Benefit Life Insurance Building in progressive Newark, N. J. Along with Newark's healthy growth came the inevitable load concentration growing pains—a condition that has been aided by the installation of two Allis-Chalmers 2000-kva network transformers.

Linked into the *Public Service Electric and Gas Company's* network system, these Allis-Chalmers units are helping to meet increased load demands of power, lighting and air conditioning. Compact design, rugged construction, conveniently located accessories, high thermal capacities, protection against corrosion and flooding — these features make A-C units the logical choice.

Two Million Kva in Operation

This installation has pushed Allis-Chalmers operating kva near the two million mark. When you consider your next network installation, it will pay you to investigate the reasons why Allis-Chalmers transformers are high on the preference list of utilities everywhere. Get all the facts. Call your nearby A-C district office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Chlorextol is an Allis-Chalmers trademark.



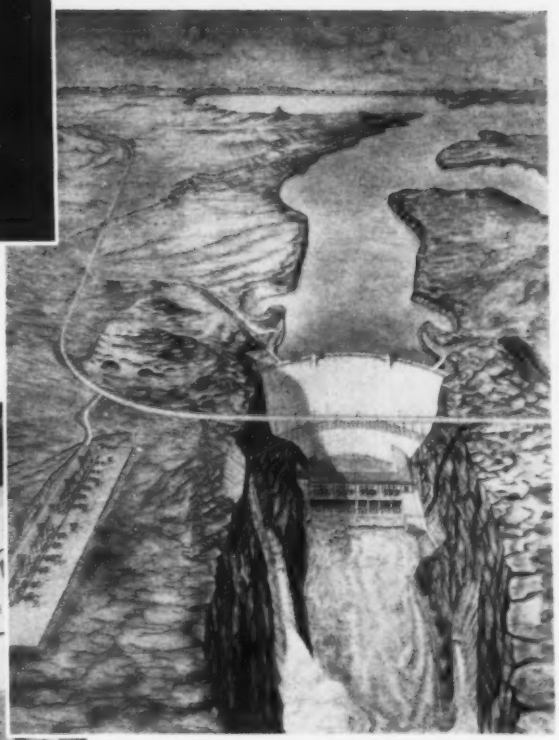
A-C CHALMERS

ALLIS-CHALMERS

A-5439

news

Reflected light against the ribbing of the surge chamber of the Swift hydroelectric project creates an interesting picture. The surge chamber of Pacific Power & Light's project is 200 ft deep. Final rock clearing is under way with the aid of the carriage. (See Growth)



Here is an artist's conception of Glen Canyon Dam and power plant, an important part of the Colorado River Storage Project. Construction started about a year ago but problems of water allocations to Southwest users still need answers

Loadbuilders: Above, Nick Mason, Portland General Electric, introduces his assistant, "George," at company's Medallion Home kick-off dinner. Right, Arizona Public Service puts kitchen on wheels to stimulate commercial equipment sales (see Market Development)

Management

Trinity Issue Pinpointed

Hearings before a House committee on a bill authorizing Pacific Gas and Electric Co. to build the Trinity project power facilities and pay the government for falling water clarified the real issue involved. Robert H. Gerdes, executive vice-president and spokesman for the Pacific Gas and Electric Co., pointed out that the federal government acknowledges that the cost of power generated in federally constructed plants would be at least 7.3 mills per kwh. The government would receive at current Central Valley project power rates an average of 4.6 mills per kwh from the sale of this very same power. Thus the government would lose an average of 2.7 mills on each kilowatt-hour sold to bureau customers—running the plants at an annual deficit of $2,500,000. This would be in addition to the initial capital, which would have to come out of the federal treasury in the event that the partnership arrangement was not authorized.

Preference customers in the California area such as the Sacramento Municipal Utility District and municipal electric power systems which now enjoy the extremely low Central Valley rate strongly advocated the all-federal project. Proponents of the partnership arrangement challenged the right of a very small percentage of the electrical users in the state to enjoy the benefit of below cost power at the expense of other customers and the taxpayers of the nation as a whole.

The partnership development plan, according to Gerdes, would produce $310,000,000 in benefits to the taxpayers and water users instead of a $99,000,000 loss under the all-federal project over a 50-year period.

► A $200,000,000 expansion program was initiated when Arizona Public Service Co.'s board of directors approved the expenditure of more than $32,000,000 for power plants and electric and natural gas lines and facilities throughout the company's service area during 1958. Largest single item in this year's budget is $7,000,000 for the construction of a major steam plant near Tempe, which will eventually cost $30,000,000. Another million will be spent on the jointly owned power station at Yuma which is being built in conjunction with California Electric Power and $5,000,000 will be spent for transmission facilities. New and improved electric distribution facilities to be built this year will cost $13,000,000.

► **George M. Brunzell**, a vice-president of Washington Water Power Co., has been promoted to the new position of executive vice-president. In the new position he will be responsible for the administration and coordination of all phases of company operations. Brunzell, a graduate of the University of Idaho in electrical engineering, was employed by Idaho Power Co. before going to WWP in 1936.

► Willis T. Johnson, vice-president and executive engineer of the California Electric Power Co. for the past six years, has been advanced to the position of vice-president and assistant general manager. He succeeds to the post vacated when Fred Oldendorf was named vice-president and general manager last July.

► California Electric Power Co. has set March 1 as the target date for the completion of the move of its headquarters from Riverside to San Bernardino. It has already begun moving poles, transformers and other equipment to its new service center in the latter area. About 600 employees are involved in the move to the new $26,600,000 general office and general service facility.

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Financial Notes

► Puget Sound Power & Light Co. will sell a $30,000,000 issue of first mortgage bonds at competitive bidding late in April, according to the company's president, Frank McLaughlin. Proceeds of the sale will be used to refund a $20,000,000 6¼% serial bond due in 1987 and to finance new construction.

► The sale of $20,000,000 of Seattle City Light revenue bonds has been recommended by the City Council Utilities Committee. This issue differs from previous issues in that it can be redeemed at a premium not to exceed 4% after 10 years but before maturity. Another new provision of the bond-sale ordinance stipulates that the issue and any subsequent bond issues may be placed on parity with one another for payment from City Light earnings.

► Southern California Edison Co. announced on Jan. 27 that it had filed a registration statement with the Securities and Exchange Commission in Washington, D. C., covering a proposed new issue of 1,000,000 shares of $25 par value cumulative preferred stock.

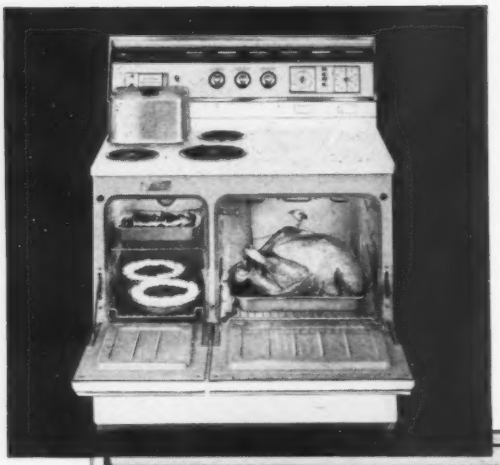
Subject to final approval by the California Public Utilities Commission of the company's application for exemption from competitive bidding, the company has entered into preliminary negotiations with The First Boston Corp. and Dean Witter & Co. to head an underwriting group that anticipated offering the stock early in February.

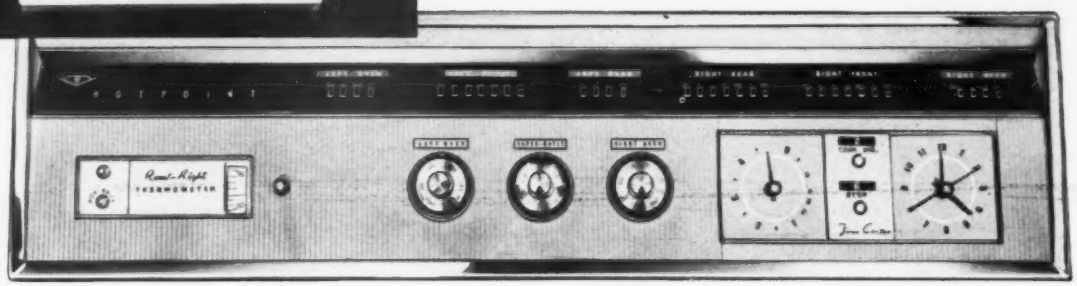
► The Tucson Gas, Electric Light & Power Co. earned $2.262 on outstanding common shares for the calendar year of 1957. Earnings for the year of 1956 were $2.015.

► A 1957 New Mexico law requiring the state to reimburse utilities for removing their facilities off highway rights-of-way was held constitutional last month by a New Mexico court. An immediate appeal will be taken as state highway department officials estimate that the decision, if upheld by the state supreme court, would cost the state over $9,000,000.

Hotpoint ELECTRIC RANGES

have the Difference
that builds load
and revenue...
automatically!





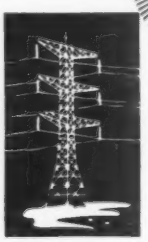
Hotpoint Electric Ranges help you build sales, load and revenue with all of the brilliant advances in quality, styling and completely automatic operation that make up the Hotpoint Difference. For example, the distinctive new control panel above provides automatic command of all surface and oven units—both time and temperature—at the touch of a button.

There's an exclusive new "thawer oven" that thaws frozen foods faster, doubles as a surface baking unit. And a new "touch open" storage drawer that glides out in response to a touch of the toe or hand. An exclusive musical meat thermometer, controlled with one simple setting, plays an appropriate tune — "Tenderly" — when the roast or fowl is done just right.

These imaginative, yet practical advantages are just a few samples of the sale-exciting features offered by the dramatic Hotpoint Difference. It's the Difference that will boost your electric range sales—and make a profitable difference in building future load and revenue.

Ask your Hotpoint Distributor to show you the Hotpoint Difference in the 5 NEW 39-inch models and the 3 NEW 30-inch models for 1958!

LIVE BETTER ELECTRICALLY



LOOK FOR THAT Hotpoint DIFFERENCE

(your customers do!)

Market Development

Unite to Get Medallions

That Western utilities were planning active tie-in with the Medallion Homes promotion of Live Better . . . Electrically was evidenced in January reports to ELECTRICAL WEST. Last month two areas told how these plans were progressing.

In southern California some 250 industry leaders met for breakfast at the Statler Hotel in Los Angeles on Jan. 29 to hear plans for an area-wide campaign to bring new and remodeled homes to standards required for a Medallion award.

This campaign to acquaint prospective homeowners and builders with the significance of earning and displaying the LBE Medallion will be conducted jointly by seven utilities with the aid of electrical manufacturers. Sponsors include: Southern California Edison, Los Angeles Department of Water & Power, California Electric Power, Glendale Electrical Department, Riverside Electric Light & Water Department, Pasadena Municipal Light & Power Department and Burbank Public Service Department.

In the Northwest, specifications for Medallion awards have been agreed upon by Portland General Electric, Pacific Power & Light, Clark County PUD, Cowlitz County PUD.

PGE introduced its promotion Jan. 28 with a steak and champagne dinner for 450 builders and industry people. Builders were told how they could wire and equip their homes to qualify for either the bronze or gold medallion.

The company itself will sponsor three Gold Medallion Homes, all to open May 4 and located in Salem, Beaverton and Gresham. It also will promote interest among builders with a contest for the best Gold Medallion Home placed on company lines in 1958. First prize is an all-expense-paid trip to Mexico City for the builder and his wife.

► A rolling showcase has been put on the road by Arizona Public Service Co. as a customer convenience and to stimulate commercial equipment sales. The kitchen on wheels is a remodeled 42-passenger intracity-type bus that was converted into a traveling showroom for on-the-spot cooking demonstrations. (See picture, page 106.)

In northern Arizona, where the bus will spend about six months, there are no industrial supply houses and restaurant people have had to travel from 200 to 400 miles to see equipment. Cecil Herron, food service consultant for Arizona Public Service, is in charge.

Hearing on Gas Levy

Home buyers in the Los Angeles area are being deprived of free choice by the gas companies' practice of levying a $55 assessment on all tract homes not equipped with gas cooking facilities, it was charged in a hearing before the California Public Utilities Commission.

J. H. Mead, vice-president of Southern California Edison Co., called the levy "inequitable" and contrary to the principles of utility regulation. He said that the charge imposed such an economic burden that some builders had been forced to install gas cooking equipment despite buyer preference for electric cooking.

Citing surveys by tract builders indicating that public preference for electric kitchens ran from 85 to 90%, Mead pointed out that built-in electric range sales in Los Angeles and Orange Counties in 1957 totaled only 13.1% of the dwelling units built. This compares with 58% in a similar area served by Pacific Gas and Electric where such limitations on the free choice of the consumer are not in effect, he said.

Montana Power Kick-Off

Montana Power Co.'s 1958 promotion plans were laid out for distributors and dealers at a kick-off meeting in Butte recently. D. J. McGonigle, general sales manager, conducted the fast-moving program in which 15 industry and newspaper people participated.

Attending were manufacturers' representatives, appliance distributors, labor representatives and electrical contractors.

In a plea for industry unity, McGonigle said: "No single bee can produce honey. It takes the whole colony." He stated that he had been advised that people are stashing away record savings accounts "so there's plenty of money. The buyer is just getting more choosy in spending it. He's doing more shopping."

Colin W. Raff, Montana Power vice-president, said that Montana business conditions during the first six months of 1958 are expected to remain at or near levels established during the last few months of 1957 but an upturn is expected during the second half of the year.

Good prospects in agriculture and petroleum, a possible comeback of lumbering based on increased housing starts and the state's potential for industrial development were cited as factors that could improve the second half materially.

Pointing out that, despite current economic softness, Montana's economy is now operating at higher levels than five years ago, he said that the company expects to spend $71,000,000 on new plants and property during the period 1957-61.

To get out of what it calls a "profitless scramble" Thompson & Holmes of San Francisco, independent appliance distributor, has reorganized its operations for full-line instead of specialty selling. Shown here are President Stuart D. Paine (seated) with Ernest Welsh (left), appliance sales manager, and E. R. Vanderlinden, Gibson sales manager. A staff of 10 will sell all three of the firm's lines, Hoffman, Easy and Gibson

► Fair Trade collapsed in Utah when G-E lost a decision to a cut-rate chain, which then flooded the local market with table appliances shipped in from out of state. After a while, even Sunbeam threw in the towel and let its line go to the wolves.

The result has been that none of the franchised dealers in that state have cared whether they promoted or sold any make of traffic appliances since. And some of the new products, usually introduced with a barrage of promotion, have fallen flat on their faces. There is no incentive where there is no profit. The cutraters use these wares as bait.

L-M's obround transformer is small, light, and has short moment arm distance from the pole. Total bending moment is greatly decreased and potential capacity of all your transformer structures is increased. Good regulation, high overload capacity and other Round-Wound characteristics have been fully maintained in L-M's obround design.

L-M's Obround Design Provides Less Bending Moment On The Pole

By **D. A. MANNING**
Assistant Product Manager
Transformers
Line Material Industries

L-M's exclusive obround transformer provides a smaller tank with less transformer oil, resulting in a light, easy-to-handle transformer. The obround design also brings the center of gravity of the transformer closer to the pole. The combination of light weight and short moment arm substantially reduces the total bending moment on the pole, and thus greatly increases the potential capacity of all your transformer structures. This advantage was accomplished without changing the outstanding performance characteristics of the Round-Wound® design.

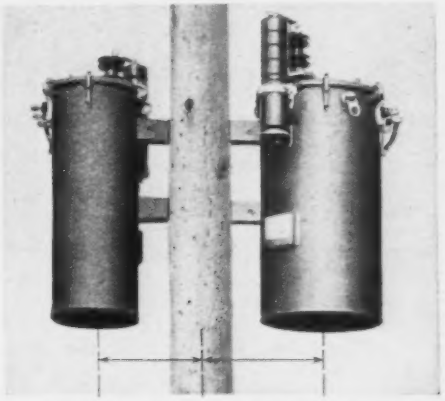
A comparison with four other major makes shows that the low bending moment of L-M's obround design is exceeded by as much as 50%. See the chart.

COMPARE Percent Bending Moment for All Five! See why more customers are selecting L-M obround transformers.

RATING	MANUFACTURER				
2400/4160 Y Voltage	Percent of L-M Bending Moment				
	LM	A	B	C	D
25 KVA	100%	110%	123%	133%	128%
50 KVA	100	123	113	142	120
100 KVA	100	123	115	137	132
167 KVA	100	105	093	115	091
7200/12470 Y Voltage	LM	A	B	C	D
25 KVA	100	131	124	149	126
50 KVA	100	123	110	150	119
100 KVA	100	119	122	149	125
167 KVA	100	107	087	112	089

In addition to reducing the bending moment for equivalent transformer ratings, you can now hang transformers of larger capacity on a pole structure and take advantage of savings such as these:

- Single-pole, three-phase transformer structures can now hold three 50 kva obround transformers instead of three 37½ kva round tank transformers. Thus you obtain 33⅓% more capacity and 15% less bending moment on the pole, and eliminate the need for a costly two-pole structure.
- Three 167 kva obround transformers can now be installed on a two-pole structure, obtaining 67% more capacity and less bending moment on the pole than with three 100 kva older-design transformers.



Comparison of these two 25 kva transformers shows how much closer the center of gravity of the obround design is to the pole than with the round design. The result is less bending moment on the pole.

Round-Wound Performance

An outstanding fact to consider on the L-M obround transformer is that, unlike the extremely light transformers of some manufacturers, there has been no sacrifice of performance characteristics. The obround retains all the outstanding performance characteristics of L-M's Round-Wound core-coil design. These characteristics include low exciting current, low noise level, high impulse strength, high short-circuit strength, high short-time overload capacity and many others.

Get Details on L-M's Obround Transformer

Ask the L-M Field Engineer for application information, weights and dimensions on obround transformers and L-M's exclusive Round-Wound design. Or write Line Material Industries, Transformer Division, Zanesville, Ohio.

LM® **LINE MATERIAL Industries**
McGRAW-EDISON COMPANY
Transformers

306

McGRAW EDISON

Biggest Market

San Francisco had the biggest Market Week in the history of the Merchandise Mart, Feb. 3-7. More than 18,000 registered, of which 1,108 were new buyers.

On the appliance floor activity centered around radio, TV and hi-fi and small appliances. In the major appliance field the emphasis was on laundry equipment, with ranges running second. New combination washer-dryers were far ahead in demand and among ranges built-ins were most popular. Control units were getting the heavy traffic among small electric appliances.

Despite the over-all crowd, many commented on the thinning ranks of major appliance displayers. Closing of these big manufacturer booths at the Mart is a logical result of the recent trend toward individual company showings.

At least one dealer liked the old way best – twice-a-year trips to San Francisco to see new products kept him away from the store less than a series of shows at various points and times. He wasn't unhappy about business prospects, however. Last year he had raised his net by closing out one store and becoming a small-volume dealer. He wasn't earning any trips—just money.

Other dealers expressed similar confidence in the future of the business for the "little fellow."

Henry A. Adams, new manager of the San Francisco Merchandise Mart, succeeding Cameron Ball, presided as Mayor at the Bonanza Night for appliance dealers. At the mike is Walter Lind, PG and E, mc for the prize drawing in which lucky dealers won gifts donated by fourth-floor exhibitors

► A bill (H. R. 10527) "to equalize rights in the distribution of identified merchandise" was introduced in the U. S. House of Representatives last month by Rep. Oren Harris (D, Ark.), chairman of the House Committee on interstate and foreign commerce. The bill would legalize resale price maintenance nationally.

Peninsula and Santa Clara County, Calif., appliance dealers and contractors associations combined in their fourth big all-industry dinner celebrating Electrical Week, Feb. 11, at Richey's Studio Inn, Palo Alto. Some 300 gathered to celebrate Edison's birthday and to hear a report on the Live Better ... Electrically program by Frank Falge, its Western manager, and about Big League Baseball from Walter Mails of the San Francisco Giants. Pictured here from left: Mails; G. L. Russell, PG and E, secretary of the Santa Clara County Appliance Dealers Assn.; Falge; J. W. Hilton, PG and E, secretary of the Peninsula Appliance Dealers Assn.; and Elmer W. Ross, Ross Radio, San Mateo, chairman of the industry meeting

Political Fronts

Glen Canyon Target—1964

Senator Arthur V. Watkins of Utah reported that the federal government plans to spend $55,000,000 on construction work at Glen Canyon Dam during the next 18 months. Some work also is in prospect on the Flaming Gorge Dam on the Green River. Funds for the latter project apparently are to be transferred from the Navajo Dam project in New Mexico, the work on which would be stopped under President Eisenhower's proposed budget recommendations. 1964 is set as the completion date for Glen Canyon.

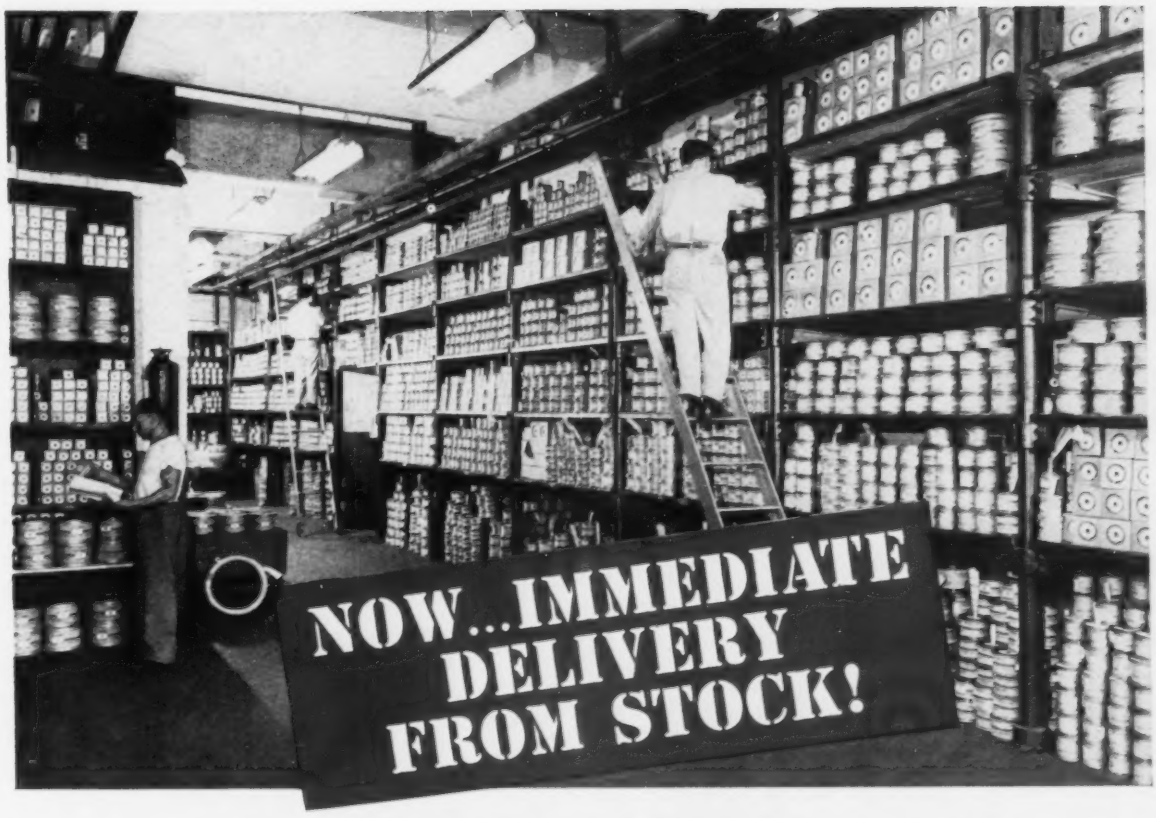
Two Idaho Dams Jeopardized

The Oregon Water Resources Board, in a report on the Middle Snake River development, urged congressional approval of funds for Interior Department study of the high Pleasant Valley Dam. It asked the Federal Power Commission to suspend any portion of licenses to Idaho Power Co.'s Brownlee, Oxbow and Low Hells Canyon Dams that would interfere with maximum economic development of the high Pleasant Valley project. The latter project would back up to the tailrace of Idaho Power's Brownlee plant, flooding out the two downstream sites of Oxbow and Hells Canyon.

The board also urged development of four lower Snake dams and the John Day Dam on the Columbia River with adequate appropriations and expedited construction to allow further time for study of economic and fishlife aspects of the Middle Snake development.

New Hells Canyon Attack

Latest proposal from the National Hells Canyon Assn. is that the federal government buy Brownlee Dam from the Idaho Power Co. as soon as it is completed and operate it as a federal project during the 10-year construction period of the federal high Hells Canyon Dam. In a hearing before the Oregon Water Resources Board on the Middle Snake, James T. Marr, president of NHCA and secretary of the Oregon AFL-CIO, told the group the government could make a profit of $11,000,000 to $12,000,000 by buying Brownlee Dam (now 80% complete) from



Orders for DRIVER-HARRIS Nickel and Nickel Alloy Wire FILLED IN 24 HOURS

If we receive your order in the morning, it will be shipped out before evening . . . this is the new service policy of Driver-Harris in the manufacture and distribution of 18 most frequently purchased Nickel and Nickel Alloys in wire form. In addition to this new warehouse stocking program, is the improved delivery schedule for Monel, Grade "A" Nickel, Inconel, R Monel and some Stainless Steels with lead time reduced to only 7 days in certain cases. The following list covers immediate availabilities. For complete detailed current listing showing all sizes and specifications, contact the nearest Driver-Harris branch — or call HUmboldt 3-4800 (New Jersey), REctor 2-9579, 80, 81, 82 (New York City).

IN STOCK READY FOR DELIVERY

MONEL	25 wire sizes from .0021 to .091
GRADE "A" NICKEL	12 wire sizes from .0025 to .091
GRADE "D" NICKEL	9 wire sizes from .005 to .015
INCONEL	3 wire sizes from .0253 to .050
STAINLESS STEEL	
Type 304	24 wire sizes from .0016 to .164
Type 316	6 wire sizes from .007 to .0135
Type 330	25 wire sizes from .0063 to .144
NICHROME*	65 wire sizes from .0007 to .289
NICHROME* V	62 wire sizes from .00045 to .289
CHROMAX*	35 wire sizes from .0031 to .258
KARMA*	36 wire sizes from .0005 to .036
ADVANCE*	49 wire sizes from .0008 to .258
MANGANIN	37 wire sizes from .001 to .1285
LOHM*	29 wire sizes from .001 to .182
MIDOHM*	28 wire sizes from .00175 to .182
30 ALLOY	28 wire sizes from .0015 to .182

LEAD TIME FOR MANUFACTURING WIRE & RIBBON

As low as 10 days for

COLD DRAWN MONEL	wire sizes from .001 to .1875
GRADE "A" NICKEL	wire sizes from .001 to .1875
COLD DRAWN INCONEL	wire sizes from .001 to .1875
R MONEL	wire sizes from .0285 to .204

As low as 7 days for

STAINLESS STEEL wire and ribbon
Types: T-302, T-304, T-305, T-316, T-430, T-446

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MAKERS OF THE MOST COMPLETE LINE OF ALLOYS FOR THE ELECTRICAL, ELECTRONIC, AND HEAT-TREATING INDUSTRIES

"THE ONLY EXTRA
WAS IN
THE CAPACITY"

When Detroit Brewer Powered-Up with New Type LD Transformers

When The Stroh Brewery Company of Detroit needed extra electrical capacity for their bottle shop, consulting engineers Harley, Ellington and Day recommended that they POWER-UP their private "substation on a rooftop." In the past, Stroh would have been faced with the almost certain expense of expanding their substation area and increasing structural reinforcing of the roof to accommodate larger and heavier transformers.

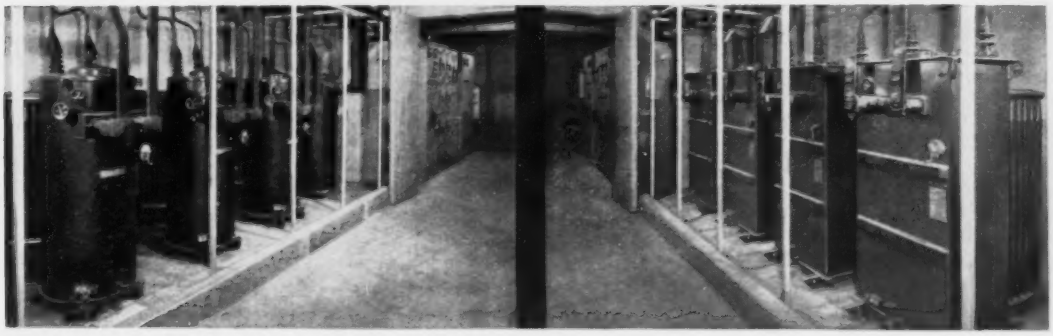
But new Westinghouse Type LD transformers are smaller and lighter. Their new circular design, with the coolers on the back only, saves up to 37% in width and base area over a Westinghouse Type SL unit of the same rating. The three 250-kva Type SL's which the brewery had outgrown were replaced with three 333-kva Type LD's—and *no extra space was needed.*

The weight problem, too, was eliminated by the compact design. Cooling oil weight is reduced over comparable Type SL units, with an overall weight reduction up to 27%. *No extra reinforcing was necessary* for the higher ratings installed in this rooftop site.

As a Stroh spokesman said of the installation: "No extra space; no extra reinforcing; the only extra was in the capacity."

* * *

Call your Westinghouse representative for the full story of how the new, streamlined Type LD transformer can help solve *your* customers' space and weight problems . . . and help them POWER-UP with capacity for their growing demands. J-70863



▲ NO EXTRA SPACE WAS NEEDED when these 333-kva Westinghouse Type LD transformers, on the left, replaced three 250-kva Type SL units similar to the units installed at right.

◀ Circular design tank and core-coil assembly are contour-fitted to provide maximum capacity in minimum space. New Lowgrocap* windings provide maximum impulse strength.

*Trade-Mark

YOU CAN BE SURE...IF IT'S

Westinghouse

Idaho Power at its construction cost of $76,000,000.

Ten years later, when the high Hells Canyon Dam would be completed, he suggests the salvaging of the Brownlee equipment and cutting a channel through Brownlee Dam before it would be inundated by the reservoir behind Hells Canyon Dam. The price, according to Marr, would be amortized in 10 years by selling all the power from Brownlee to the Idaho Power Co. at 4.6 mills per kwh.

Initiative Seeks Oregon Authority

The Oregon Electric Consumers Council, a group of REA cooperatives, public utility districts, municipal power systems, the state labor council, the Oregon State Grange and Oregon Farmers Union are circulating a petition which would place an initiative measure before the voters of Oregon this fall. The measure would set up an Oregon power development commission and make the state a preference clause customer of the Bonneville Power Administration. The commission would have authority to build dams and transmission lines, to purchase power from federal agencies and sell energy to public and private utilities and industries.

Price Tag

The Feather River project and related facilities will cost $2,159,480,000, according to the California Department of Water Resources. The new price tag assumes that the federal government will participate in the construction of the San Luis reservoir and dam. It calls for a peak capital expenditure of $219,000,000 in 1965, although no recommendations for additional funds, other than those already appropriated for 1958 and 1959, were recommended. Approximately $1½ billion of the amount is for the construction of the main Feather River project with the balance earmarked for aqueducts and other hydraulic facilities that will be required.

► Washington State Senator Gerald Dixon has stated that he will initiate legislative action to abolish the State Game Commission unless that body cooperates with the city of Tacoma in eliminating road blocks to the proposed construction of the Cowlitz River hydroelectric project.

With the Contractors

NECA Group to Train Linemen

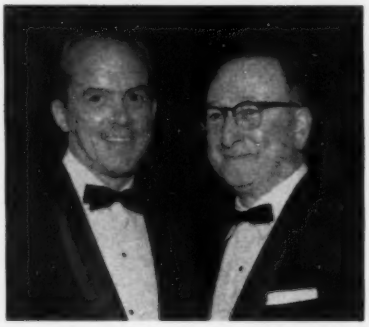
A linemen's training course for apprentices, journeymen and supervisors is being readied by the Mountain States Line Constructors Chapter, NECA, in cooperation with the line construction local union of IBEW in Colorado, Wyoming, Utah and Idaho. The program is to be known as a joint manpower program, according to Joe Bollinger, chapter manager, to assume the responsibility for training of linemen in order that contractors will be qualified to do more work for electrical utilities and REAs.

"In the past we have depended upon the utilities to train our manpower," says Bollinger, "putting us in the position of saying in effect 'you train the men for us and we will do your work.'" In the past it was natural for the utilities to feel that if they must train the men they might as well keep them and do their own work.

"We want to say to our utility customers that we have an adequate supply of highly skilled men trained especially to do their kind of work with a comprehensive and continuing training program so that they can be assured of our ability to handle their work to their satisfaction. Hence they will not need to keep large crews on their own pay rolls, nonproductive much of the time, but can be assured that their work will be done when needed."

An outline of the program has been developed and will be reviewed at a special meeting April 23 in Billings at which time it is expected it will be put into effect. Locals of IBEW affected include Nos. 111, 113, 969 and 12 in Colorado, 415 and 322 in Wyoming, 57 in Utah and 283 and 291 in Idaho. Montana may join the training program.

► Sacramento Valley Chapter, NECA, installed its new president, B. L. Slater of Folsom, Calif., at the annual dinner and installation of the chapter Jan. 24 in Sacramento. E. T. French, president last year, became a member of the directors. Other officers were Kenneth Carlson, vice-president; L. C. Wesleder of Auburn, secretary; Robert Jewell, treasurer; Paul Gatejen and Rex Moore, directors. J. D. O'Connor, vice-president, District 9, NECA, is also a member of the chapter. Hugo Becker is chapter governor.



MacFarlane Berg

L. A. Chapter Installs

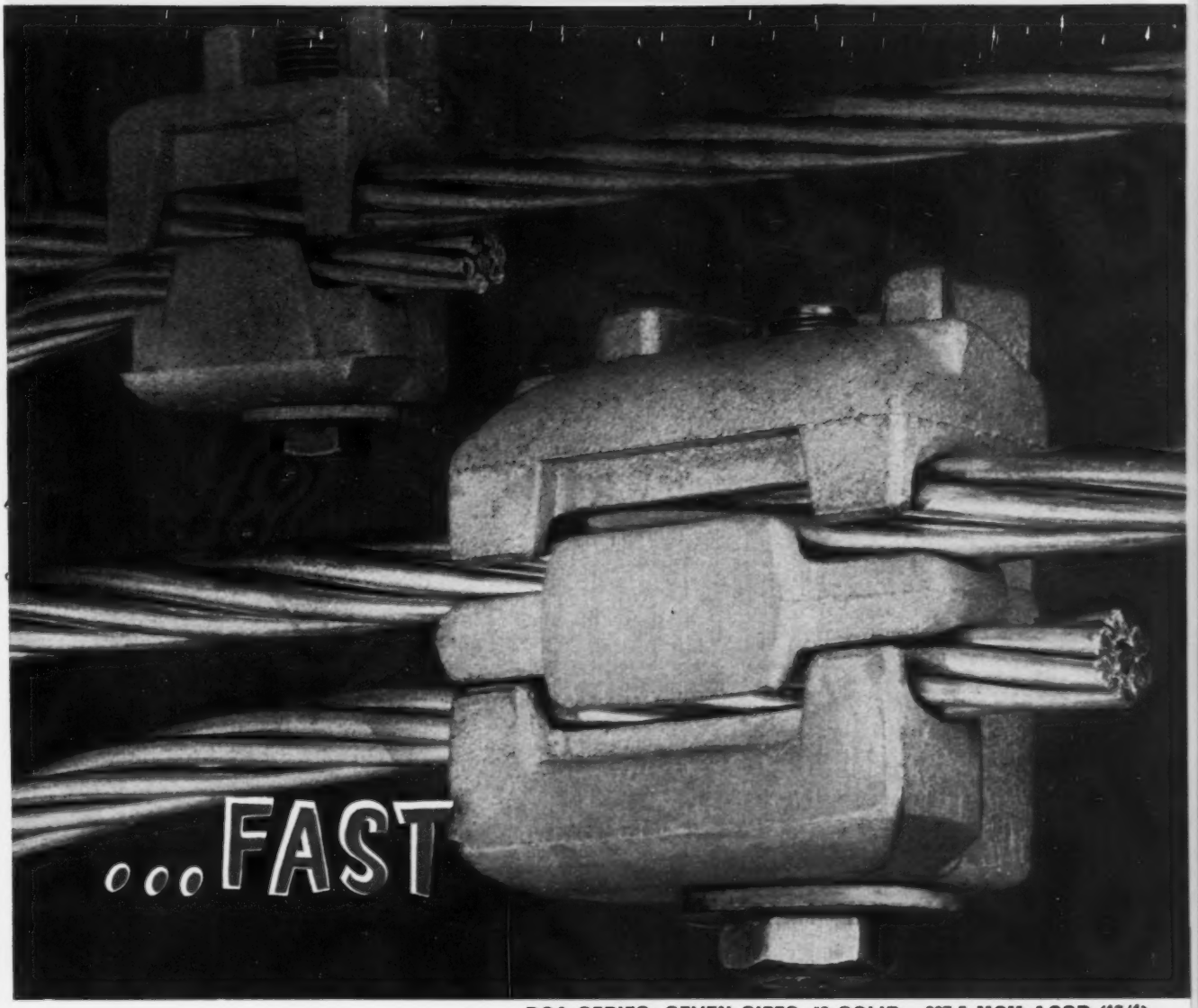
Los Angeles Chapter, National Electrical Contractors Assn., began a new year with new officers and a new program under R. B. Carey, chapter manager. The officers were installed at the annual Ladies' Night and installation of officers at the Ambassador Hotel Jan. 10. Designated as Warren Penn Night, approximately 425 persons from the four counties in the chapter's jurisdiction paid homage to Warren Penn who retired after serving 16 years as chapter manager.

A. L. Berg, Berg Electric Corp., Los Angeles, was installed as president, succeeding Andrew L. Hannon, Hannon Engineering Co., who became a member of the board of directors. Robert J. MacFarlane, Santa Ana, was elected vice-president, J. B. Shamel, California Electric Co., re-elected treasurer and Richard E. Arbogast, Newbery Electric Corp., governor. Other directors include Cliff Allen, T. O. Barr, Lewis V. Barth, Stanley R. Brekhus, Anthony Carbone, Oscar Chagnon, B. Hartman, Sidney F. Hill, Charles Stetson, Harry Vancott, Chauncey W. Voorhies and Charles A. Wikle.

Division chairmen for 1958 are W. H. Hubbard, Foothill Division; Jay Luster, Harbor; John A. Pouk, Orange County; Gordon J. Krysan, Riverside County; and Carl Masingale, San Bernardino County.

Added to the staff at headquarters has been Pat Nagel to become assistant chapter manager. Nagel has been engaged in industrial relations, journalism and public relations, coming from Connecticut. Jack Rollins continues as the chapter's director of public relations.

President Berg has served the chapter as the representative on NECA's market development com-



DGA SERIES: SEVEN SIZES: #8 SOLID — 397.5 MCM ACSR (18/1)

One Piece Construction: Makes for fast installation. Just hook on the Main, insert Tap and tighten!

High Conductivity Spacer: Anderson's soft, pure, aluminum Cover-All Spacer assures additional contact with individual strands. Spacer design material and massive construction combine to provide cool running, long-life contacts.

Extended Spacer for Easy Application: Whether applying the DGA on "hot" or "dead," the Spacer can easily be picked up for Tap insertion.

Positive Interlocked Upper and Lower Grooves: Main and Tap groove alignment is maintained by interlocked casting bodies, thus aiding installation and improving contact efficiency.

Pre-Inhibited: All DGA connectors with spacers are chemically cleaned and inhibited at the factory. Contact resistance is greatly reduced and maintained by Anderson's exclusive inhibitor coating process. Gives corrosion protection without surface greasiness or tackiness.

Kleen-Seel: At slightly additional cost all DGA connectors will be delivered with grooves inhibitor-packed and the connectors sealed in polyethylene bags.

ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama

Export Representative: International Standard Electric Corp.

ANDERSON ELECTRIC

Research / Quality / Performance / in Aluminum and Bronze Products

Aluminum and Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATION • TRANSMISSION • DISTRIBUTION

mittees and has been a director and active leader in the association for some years. Charles A. Wikle has been appointed chairman of a committee for the joint Districts 6, 8 and 9 conference to be held at the Biltmore Hotel May 5 to 7.

New Service

Electrical Estimators has moved to the Plan Room building at 1417 Georgia St. in Los Angeles. This building houses Plan Room Inc., a brainchild of its president, Charlie Hayes, who is also president of Electrical Estimators.

The new venture was inaugurated Jan. 2 as a service providing a central location where people in the building industry can review plans. The plan room itself occupies 5,000 sq ft, one entire floor of the five-story building, and provides enough room to permit 90 estimators at one time to review plans and make take-offs. The rest of the building will be leased to offices. A number of manufacturers' agents and representatives as well as electrical contractors have applied for office space.

Almost 300 companies in the building industry have already subscribed to the Plan Room service and Hayes expects the subscriber list to swell to 1,000 within 18 months.

Seminar for Apprentice Instructors

An unusual training seminar for apprentice instructors in the San Francisco Bay area was operated with fine attendance for the week of Feb. 10 through 14 at San Jose Junior College through the sponsorship of the Bay area industry funds of electrical contractors and unions.

Workshop type of meetings were held to pool the experience of apprentice instructors, many with years of experience, and to give them training in presentation of their material and leadership techniques for conference training.

Assisting in the program were Dr. Mel Barlow, Joseph Bellenger, Milo Johnson, Dr. Cliff Dobson, George Rosecrans and Dr. Sid McGaw.

► In Canada where the Red Seal standard has been continued since wiring certification began the B. C. Electrical Service League reports 3,072 homes in the Greater Vancouver area in 1957 were wired for Red Seal and 123 had 200-amp main switch and were given Gold Seal certificates.

Association Affairs

NAED Area Meetings

National Association of Electrical Distributors area meetings are being held prior to the national convention in June, according to William Jewell, Western Region manager. A meeting was held Feb. 14 at the Washington Athletic Club in Seattle for the Pacific Northwest members coincident with Electrical Week and Electrical Industry Exposition staged during that time. Walter Maytham, vice-president, Westinghouse Electric Corp., was to be the speaker.

On March 7 or thereabouts a southern California meeting was scheduled all day at Hesperia, Calif. Another for central California and northern Nevada was scheduled for March 13 at the Claremont Hotel, Berkeley.

Plans for a fall series include a Northwest meeting at Harrison Hot Springs, Canada, Sept. 12 and 13. It will be a two-day affair with one day devoted to business sessions and the other to recreation. Similarly northern California will have a two-day meeting Sept. 19 and 20 and the southern California group will meet at the Valencia in La Jolla for two days Oct. 23 and 24.

PCEA Sections Meet

PCEA is holding two important conferences this month—the annual meetings of the Business Development Section, March 6-7, at the Hotel Statler in Los Angeles and of the Engineering and Operating Section, March 27-28, at the Sheraton-Palace in San Francisco.

J. Clark Chamberlain, San Diego Bureau of Home Appliances, is chairman of the Business Development Section and J. H. Drake, Southern California Edison Co., is chairman of the Engineering and Operating Section.

Featured speakers and their topics at general sessions of the Business and Development Section conference will include James T. Coatsworth, commercial director of Edison Electric Institute, "Let's Face Our Job"; Paul D. Brooks, vice-president, American Gas & Electric Service Corp., "Mining in Pay Dirt"; Esther Foley, home service director, McFadden Publications of New York, "Who Is Our Market," "What Is She Like" and "How Do We Reach Her"; Harold Quinton, president, Southern California Edison Co., "Leadership—The Essential Ingredient in Selling."

General session speakers and topics for the Engineering and Operating Section conference will include Dr. Joseph Kaplan, chairman, U. S. National Committee, International Geophysical Year, "The International Geophysical Year"; C. W. Leihy, editor, ELECTRICAL WEST, "Is an Electrical Utility Career Worthwhile?"; Dr. William E. Parkins, chief of engineering, Atomics International, "Operating Experience With Sodium Reactor Experiment and the Organic Moderated Reactor Experiment"; J. C. Rengle, PWR project manager, Bettis Atomic Power Division, Westinghouse Electric Corp., "Operation of the Shippingport, Pa., Nuclear Power Plant"; Dr. Ralph D. Bennett, manager, General Electric Vallecitos Atomic Laboratory, "Experience with the Vallecitos Atomic Project."

Chairman Drake announces that on Saturday, March 29, a limited number of delegates (those getting "first-come, first-served" tickets) will take a field trip to the Vallecitos Atomic Power Project.

► Northern California Chapter, NECA, directors re-elected the chapter officers at their January board meeting. Andy Maser, Thompson Electric Co., Walnut Creek, was re-elected president; R. W. Beard, Scott-Buttner Co., Oakland, governor; and Jack Ellis of Napa vice-president. George Curran was elected treasurer to succeed Walter Vance Jr.

A series of meetings for the three branches of the chapter were announced in February. The March meetings of the Alameda County, Solano-Napa Counties and Contra Costa County branches are to hear detailed reports of the national convention at Cincinnati from R. W. Beard, governor; Jack Ellis, vice-president; Chet Brunelle and Henry Hertlein. For the March end of month and early April meetings Frank Gadsby, representing the Estimatic system of estimating, is scheduled to make a presentation to each of the chapters. Machine bookkeeping will be presented to the late April and early May meetings.

► Central New Mexico Chapter, NECA, at Albuquerque recently elected John N. Yearout as president. He was governor of the chapter last year. Kenneth L. Conwell is the new vice-president; E. T. Wort-

An improved Combination Starter for extra safety

While the changes in the new Allen-Bradley Bulletin 712 and Bulletin 713 starters may be relatively minor, they were made in your interest—to give you the best control on the market.

The new operating lever has been attractively restyled and structurally improved. Now the disconnect switch can be locked "open" or locked "closed"—with three padlocks of any kind. For the maintenance engineer, a concealed latch pin is built into the lever, which permits opening the door of the cabinet without opening the disconnect switch and stopping the motor. The door can also be padlocked shut independently of the operating lever.

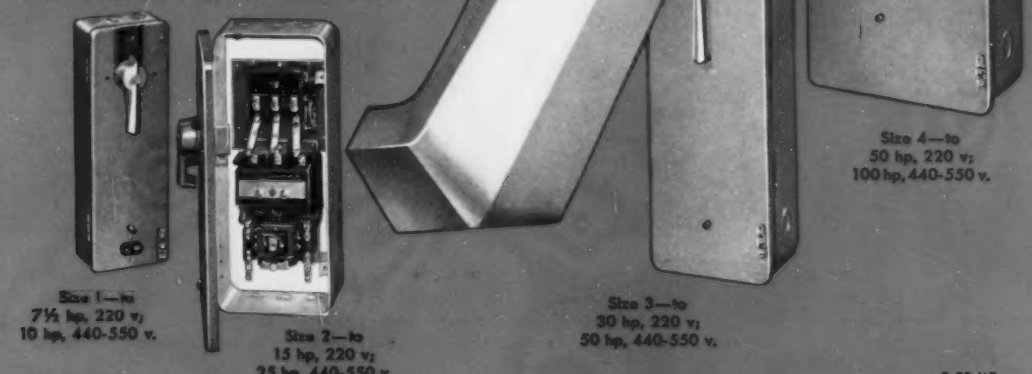
With the disconnect lever in the "off" position, the cabinet door can be opened. At a glance, it can be seen that the movable contacts are open. An added "safety" feature—the incoming line connections are covered with an insulating plate to prevent accidental contact.

ALLEN-BRADLEY
QUALITY

MOTOR CONTROL

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

BULLETIN 712—These modern A-B combination starters cost no more than a separate starter and disconnect switch, and make a neater, safer, more attractive installation.



Size 1—to 7½ hp, 220 v; 10 hp, 440-550 v.

Size 2—to 15 hp, 220 v; 25 hp, 440-550 v.

Size 3—to 30 hp, 220 v; 50 hp, 440-550 v.

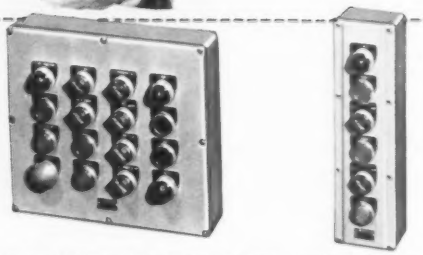
Size 4—to 50 hp, 220 v; 100 hp, 440-550 v.

3-58-MR

Not only the Motor Starters, but the Accessories must be "Quality," too!

we specify ALLEN-BRADLEY ...all the way

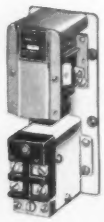
"Trouble" that shows up in a motor starter is often traced to a faulty operating auxiliary—such as a limit switch or even a push button station. Allen-Bradley builds the same high quality into its many accessories as it does into its motor starters—to give you millions of trouble free operations. They are also tested as thoroughly. Contacts are usually double break and always are of a silver alloy, which means they remain in perfect operating condition. It will pay you, too, to specify Allen-Bradley *Quality* control—"all the way!"



Bulletin 800T Oiltight Control Stations. Available in from one to sixteen units, in die cast aluminum enclosures.

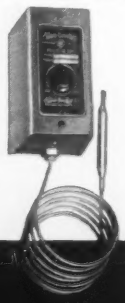
Bulletin 802 Precision Limit Switch, with oil-tight head and body.

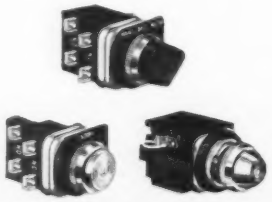
Bulletin 805 Foot Switch. In rugged die cast enclosure for the toughest service.



Bulletin 849 Pneumatic Timer. Reliable and accurate.

Bulletin 837 Temperature Control with snap action, precision switch.





Bulletin 800T Oiltight Push Button, Selector Switch, and Press-to-Test Pilot Light.

Bulletin 800 Standard Duty Push Button. One, two, and three buttons; also as selector switch.

Bulletin 836 Pressure Control in NEMA 4 watertight enclosure.

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QUALITY
MOTOR CONTROL

man, treasurer; F. L. Mulberry Jr., governor. Benjamin T. Rogers is chapter manager.

► New committee chairmen for the Rocky Mountain Electrical League have been appointed by Veryl Hoover, Wyoming manager for Pacific Power & Light Co., 1958 president.

These chairmen are: Warren A. Terry of Home Light & Power Co., Greeley, Colo., utilities division; Harold Klingenberg, Hamilton Associates, Denver, manufacturers; Ward Terry, Ward Terry & Co., Denver, distributors; Harris Steele, Reliable Electric Co., Denver, contractors; Leonard A. Robohm, Robohm Appliances & TV, Denver, dealers; S. William Huntsman, Public Service Co. of Colorado, Denver, sales and promotion; C. M. Melby, PSC, Denver, accounting; C. A. Stoakes, PSC, Denver, adequate wiring; Lewis Gay, Allis-Chalmers Mfg. Co., Denver, engineering; John N. Kerr, PSC, Denver, information; Ray Jones, Ray Jones Washing Machine Co., monthly luncheon committee.

► R. D. Moody of Allis-Chalmers Mfg. Co. and Kenneth G. Eaton of Anaconda Wire & Cable Co. will be co-chairmen for the spring conference of the Rocky Mountain Electrical League, to be held in Denver on April 13-15.

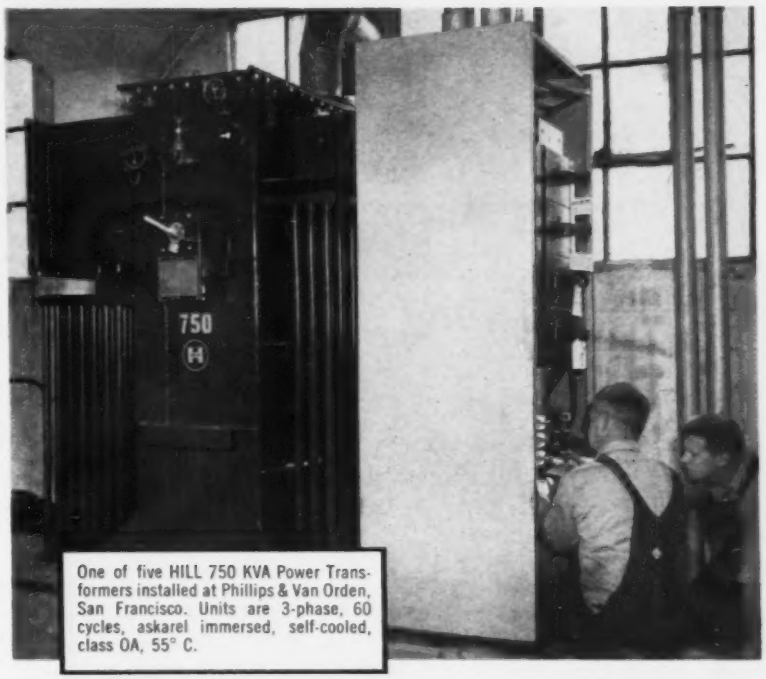
► The Colorado Farm Power Council elected Glenn Stukey, manager of the Yampa Valley Electric Assn., as president for 1958, succeeding W. L. "Bill" Duncan of G-E Supply Co.

► Jim B. Hartwig, vice-president and general manager of the North Coast Electric Co., Seattle, has been named as Electrical Man of the Year. Hartwig received a plaque from the Puget Sound Electric League at a recent meeting from Bob Lemman, league president. Hartwig serves on the board of governors of the National Association of Electrical Distributors and is also on the board of the Puget Sound Electric League.

► The National Association of Corrosion Engineers will hold its 14th annual conference at San Francisco Civic Auditorium, March 17-21.

► **WESCON, WCEMA and IRE** Los Angeles Section have combined offices at a new location, 1435 S. La Cienega Blvd., Los Angeles. A year ago, the offices were combined with headquarters on La Brea Ave. Larger area is provided at the new quarters.

HILL TRANSFORMERS will keep presses rolling in new West Coast Printing Plant



One of five HILL 750 KVA Power Transformers installed at Phillips & Van Orden, San Francisco. Units are 3-phase, 60 cycles, askarel immersed, self-cooled, class OA, 55° C.

To meet printing deadlines requires speed, accuracy and dependability from all equipment... and Hill Transformers were selected as the power source for this ultra-modern new San Francisco plant.

Hill's flexible production schedules enable electrical contractors to meet completion dates on time. And Hill manufacturing to exact design specifications, and to NEMA-ASA standards as well, assures trouble-free performance that "keeps the presses rolling".

Speed, accuracy, dependability. Let Hill help you do a better job with transformers that stay in service!

• OIL FILLED • ASKAREL • DRY TYPES

HILL

Power and distribution transformers are available up through 5000 KVA for every application.

HILL TRANSFORMER CO., INC.

1030 WASHINGTON STREET • SAN CARLOS, CALIF.

Available through leading electrical wholesalers

• EASIER FIELD INSTALLATION

"*Superforming*" of special spring-type wire at factory into uniform spirals that snap perfectly into place by hand without the use of tools . . . eliminates costly, haphazard field fabrication of armoring.

• GREATER GRIPPING STRENGTH

The "close-pitch" spiral of "*Superformed*" Armor Rods winds around conductor developing a permanent non-slip full length grip that is stronger and tighter than made by any other method of armoring.

• LONGER-LASTING PROTECTION

"*Superformed*" Armor Rods reduce conductor strain...prevent conductor pitting and wear . . . eliminate hazards of end clamps.

To get the best — specify Fanner "*Superformed*" Armor Rods. Get acquainted with the important savings they offer by writing for descriptive literature today.

CENTER-MARKED, COLOR CODED AND PACKED IN CONVENIENT CARTONS

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Public Power

Consolidating Suits

Suits brought by 12 Wyoming communities contesting the taxation of municipally owned electric utilities are being consolidated and transferred to District Court at Cheyenne.

The State Board of Equalization ruled last summer that the municipally owned power plants are subject to assessment and taxation under a new constitutional amendment adopted by voters in November 1956.

The communities maintain they are exempt from taxation because the power plants are a "governmental function," and thus could be exempt under a bill passed by the 1957 legislature.

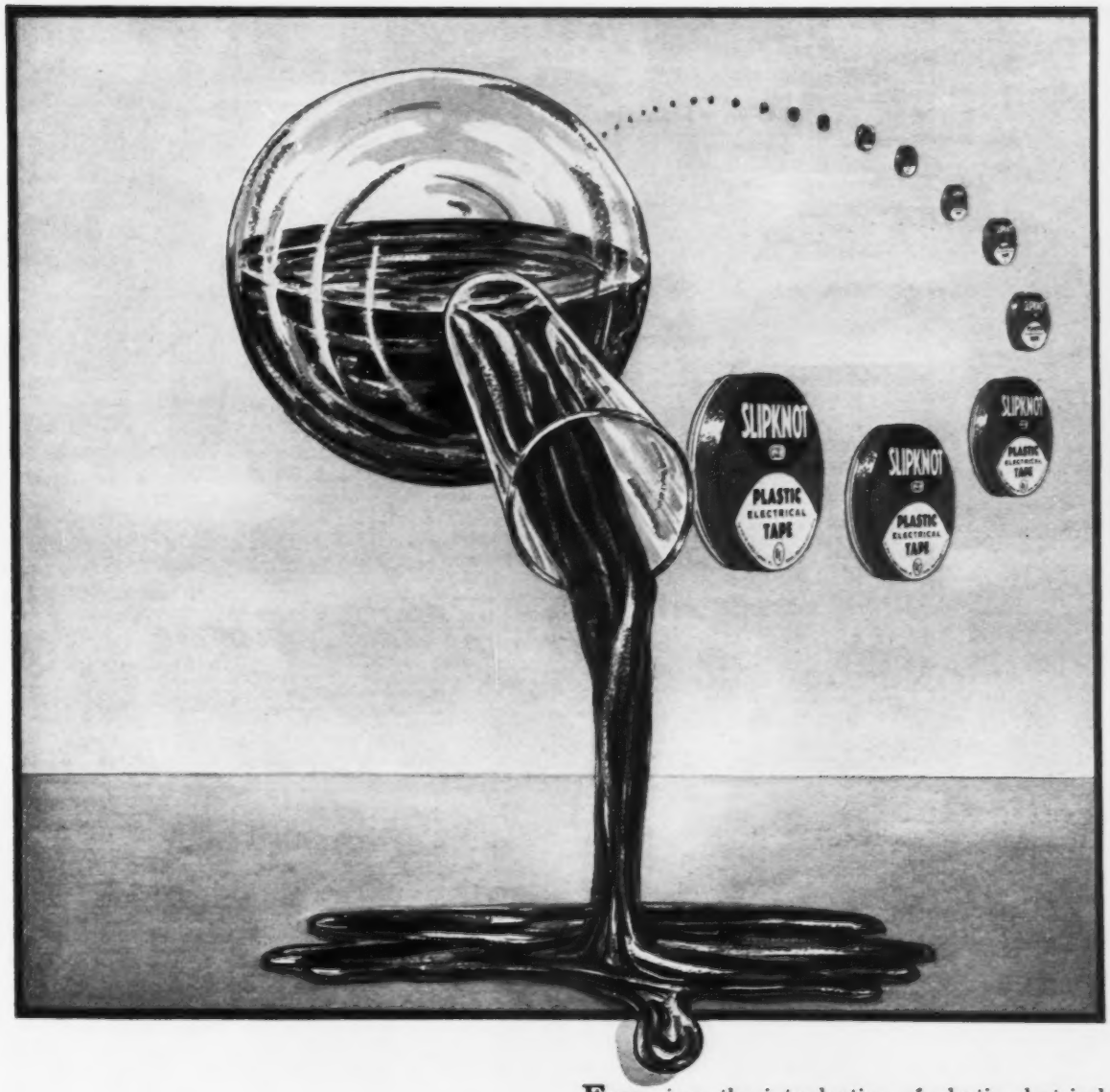
► Turbine foundations are in and all major pieces of equipment have been ordered for the $6,500,000 fourth unit of Glendale Water & Light Department's steam plant. The 44,000-kva unit is scheduled for service by October 1959. Glendale will start work late this month on a $425,000 substation to provide four additional 4,000-kv feeders.

► Los Angeles Department of Water & Power is expecting delivery this month of the first of six 156,000-kw General Electric generators for Scattergood steam plant. The unit is expected to go on the line in October or November.

► Directors of Sacramento Municipal Utility District have authorized an $857,749 contract for the purchase of transformers. The contract will be filled by General Electric Co., Westinghouse Electric Corp., Line Material Co., Allis-Chalmers Co. and Kuhlman Electric Co.

► An ordinance, which would have required a public vote March 11 on proposed abolishment of the municipal utility board at Tacoma, was defeated by the Tacoma City Council. Councilman Frank Stojack originated the ordinance in order to replace the present nonsalaried appointed board with an elective salaried board. The vote was 6-3 against the proposal.

► Generation of secondary energy is again taking place at Hoover Dam for the first time since the four-year drought caused a drastic cut in the firm energy schedule. Lloyd J. Hudlow, project manager, said increased energy generation is the result of last



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MAKES THE DIFFERENCE

EVER since the introduction of plastic electrical tapes, a major problem has been to keep the tape from creeping, and the adhesive from stripping off the base. A plastic tape with imperfectly bonded adhesive means trouble, as your experience with ordinary plastic tapes may have shown.

Plymouth's research laboratories have solved this problem with ZF-90 — proven formula for *total adhesion* — molecular fusion of special adhesive to vinyl base — to produce SLIPKNOT #7 PLASTIC ELECTRICAL TAPE. It *molds totally* around any job. The adhesive *cannot* be separated from the base, and therefore *will not dry out.*

Once you try new SLIPKNOT #7, you'll *know* you can *depend* on it. *Specify* it from your distributor.

SOLD ONLY THRU RECOGNIZED WHOLESALERS

PLYMOUTH RUBBER COMPANY, INC.

Makers of SLIPKNOT FRICTION TAPE

DIVISION 14 CANTON, MASSACHUSETTS

ALCOA ANNOUNCES 62% CONDUCTIVITY FOR ALUMINUM CONDUCTORS

CONDUCTIVITY GUARANTEED—All difficulties and technicalities involved in supplying this new high-quality conductor have already been worked out. Right now, we are shipping redraw rod and conductor with minimum guaranteed conductivity of 62% IACS (International Annealed Copper Standard).

NO DECREASE IN TENSILE STRENGTH—Users of Alcoa® Aluminum Conductors will have to make no adjustments to compensate for changes in physical characteristics of this new high-conductivity conductor. There has been no downward revision in tensile strengths or mechanical properties of Alcoa redraw rods or conductors.

NO INCREASE IN COST—This remarkable new development in electrical technology is offered to the industry at no increase in cost over EC grades of conductor formerly supplied.

WHAT THIS MEANS TO YOU—The advantage in using 62% aluminum conductor can be computed as an increase in the conductivity of the conductor. Assuming the following conditions, here is a rather favorable example based on the capitalization factor:

1,113,000 cm 61 strand aluminum Weight = 1.045 lbs per foot Peak load current = 600 amps
Line losses = $0.005 per kwh Load factor = 50% Avg. operating temp. = 50°C
Interest rate on investment = 4% Amortization period = 30 years
For 61% conductivity $r_a = 0.0954\Omega$/mi. $P_L = 1^2 r_a = 600^2 \times .0954 = 34.34$ kw per conductor mile
From Section 13-1 *Standard Handbook for Electrical Engineers*, curve of annual energy loss for given peak load at various load factors.

Energy loss = $34.34 \times 2650 = 91{,}000$ kwh
Annual cost of losses = $91{,}000 \times .005 = \$455$ per conductor mile

For 62% conductivity $r_a = 0.0939\Omega$/mi.
Therefore, annual cost of losses = $447.85 per conductor mile
Annual savings = $455.00 − $447.85 = $7.15 per conductor mile

$$\text{Present value of benefits} = C\frac{1-(1+i)^{-n}}{i}$$ where i = interest rate, n = amortization period, C = annual savings

$$\text{Present worth of benefits} = 7.15\frac{1-(1+.04)^{-30}}{.04} = \$123.60 \text{ per conductor mile}$$

Converting to a per-pound value

$$\text{Present value} = \frac{123.60}{5280 \times 1.045} = \$0.0224 \text{ per lb}$$

This means one could afford to pay up to 2.24 cents per-pound premium for 62% conductivity aluminum conductor based on the annual benefits received.

Or, on the other hand, if you're a skeptic and not particularly concerned with the future, consider that one merely wants to buy a conductor of a given resistance. If the price of 1,113,000 cm 61% conductivity is $0.3902 per lb, the resistance equivalent 62% conductivity conductor yields a benefit of $62/61 \times .3902$ or $0.3967 per pound.

This means, of course, that the 62% conductivity conductor represents a saving of $0.0065 per pound.

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ELECTRICAL CONDUCTORS AND ACCESSORIES
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

"ALCOA THEATRE"
Exciting Adventure, Alternate Monday Evenings

year's runoff from the Rocky Mountains into Lake Mead.

► Franklin County (Wash.) Public Utility District will expand its distribution system in Blocks 14, 18 and 19 of the Columbia Basin project during 1958. About 30 miles of 12.47-kv primary line will be constructed.

REA Loans

The following loans have been approved for Western REA cooperatives.

Desert Electric Cooperative, Twenty-nine Palms, Calif., $246,000 for 50 miles of distribution line to serve 250 new rural customers.

Kittitas County PUD, Ellensburg, Wash., $273,000 for construction of 13 miles of distribution line to serve 88 new customers.

Yellowstone Valley Electric Cooperative, Huntley, Mont., $609,000 for 37 miles of distribution line to serve 182 new rural customers.

Columbia Power Cooperative Assn., Monument, Ore., $222,000 to finance the construction of 30 miles of distribution line to serve 34 new customers.

Alamo Power District No. 3, Alamo, Nev., $130,000 for six miles of distribution line to serve 13 new customers, and for system improvements.

Sheridan - Jones Rural Electrification Assn., Sheridan, Wyo., $175,000 for 28 miles of distribution line to serve 41 new customers.

Klickitat County PUD, Goldendale, Wash., $1,140,000 for 8½ miles of distribution line to serve 128 new customers, and to make system improvements, as well as 23 miles of 69-kv transmission line.

Douglas Electric Cooperative, Roseburg, Ore., $864,000 for 24 miles of distribution line to serve 284 new customers. Five new substations, 29 miles of transmission line and other system improvements are planned.

Intermountain Electric Assn., Littleton, Colo., $1,112,000 to construct 116 miles of distribution line to serve 222 new customers. Capacity of 300 distribution transformers will be increased, and 30 miles of tie line plus 23 miles of 44-kv transmission line will be constructed.

Tri-County Electric Assn. Inc., Sundance, Wyo., $1,115,000 for 317 miles of distribution line to serve 286 new customers. Also planned is a transmission line between Osage and Sundance, and a headquarters building in Sundance.

Growth

► The New York engineering firm of Ford, Bacon & Davis has proposed a study to determine the economic feasibility of a major hydroelectric development on the island of Kauai. The firm indicated that the power might be used in conjunction with a fertilizer plant, as well as for processing bauxite.

► The Corps of Engineers has called for bids for the first construction contract at John Day Dam. The bid will be for access roads.

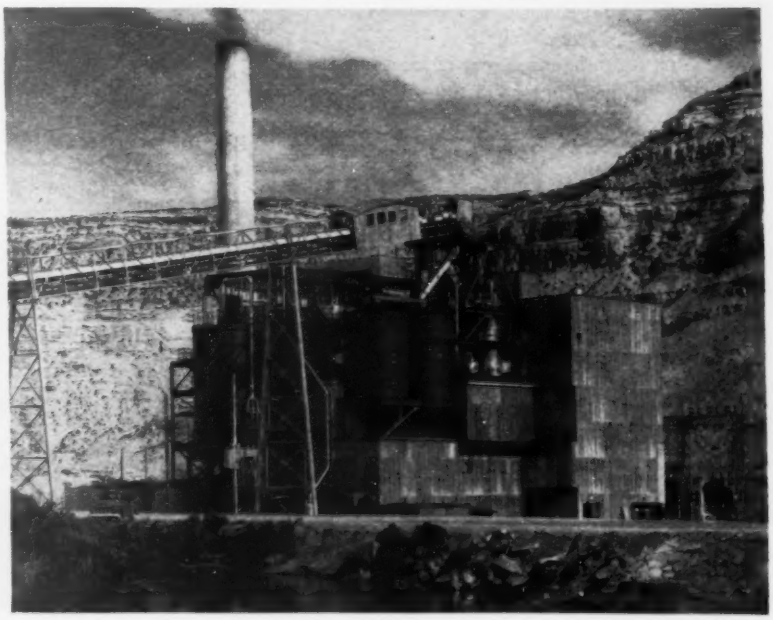
► Portland General Electric Co. will invest an additional $180,000 in exploration at Round Butte Dam site, eight miles upstream from its new Pelton Dam on the Deschutes River in central Oregon. The PGE board authorized Bechtel Corp. to make additional feasibility studies following acceptance of previous findings in the 250,000-kw proposed dam site.

► Excavation is being resumed on the High Gorge Dam of Seattle City Light. Work was stopped more than a year ago because of water seepage through an ice barrier. The ice barrier technique was chosen because of the difficulty of reaching bedrock through a silt pocket containing many large rocks.

► The Corps of Engineers announced the official site for John Day Dam to be Columbia River mile 215.6, about four miles below the mouth of the John Day River. Official location of the dam site clears the way for an early bid call on construction of access roads to the dam site.

► Seven Pacific Northwest utilities have signed 50-year contracts for the use of the BPA transmission grid to wheel power from Grant County PUD's Priest Rapids Dam into their service areas. Initial deliveries are scheduled for April 1959.

► Average energy load in the Western section of the Pacific Northwest Power Pool has eased off 400,000 kw because of slowdowns in lumbering and mining industries, Jack Stevens told the Puget Sound Utilities Council. A single degree variation in temperature during the winter's peak varies power demand by 30,000 kw.



CAMEO ON THE LINE—New Cameo steam-electric generating station placed in operation by Public Service Co. of Colorado at site four miles east of Palisade in western Colorado. The station, PSC's 18th in Colorado, has an initial generating capacity of 22,000 kw. It is designed for future expansion to as much as 300,000-kw generation at the site. The plant is near the Cameo coal mine. Coal to fire the plant is transported directly from the mine on a 1,195-ft conveyor belt system. The boiler is also equipped with conversion units to burn natural gas or oil if necessary

- One single instrument with internal limit switches for limiting the range of operation.
- Positive assurance that limits are set on one of the designated operating points.
- Equipment need not be de-energized to adjust the limit levels.
- Raise and lower limits may be set independently.

LOAD RANGE SELECTOR

Supplied on Westinghouse single-phase, type URL and URF, feeder voltage regulators; on all standard three-phase type URS voltage regulators rated 750-kva and below.

I-70812

YOU CAN BE SURE... IF IT'S Westinghouse

GUY-GRIP dead-ends...

the modern twist in guying

The picture comparison makes GUY-GRIP dead-end benefits obvious:

1. THE ASSEMBLY LOOKS BETTER...
slim, modern GUY-GRIP dead-ends, free from bolts, give your guying jobs a finished, craftsmanlike appearance.

2. YOU SAVE *HOURS* OF COSTLY TIME...
takes only a minute to install a GUY-GRIP dead-end — about the same time spent in securing one nut and bolt.

3. YOU ELIMINATE ALL TOOLS...
wrenches, pliers, and other tools are completely unnecessary in applying GUY-GRIP dead-ends. The operation is done entirely by hand.

4. ASSURES POSITIVE GRIP...
under all field conditions, whether the guy is relaxed or under tension. Once the legs of the GUY-GRIP dead-end are entirely applied to the strand, you *know* the assembly is complete and permanent.

5. RESISTS STRAINS AND WEATHER...
GUY-GRIP dead-ends can take an unbelievable beating. Tension, impact, temperature extremes . . . whatever force is exerted against GUY-GRIP dead-ends, they withstand the most extreme conditions, never relinquishing a single ounce of their gripping power.

These are only a few of the many reasons why you might want to try the modern twist in guying. Write for more information: Preformed Line Products Company, 5349 St. Clair Avenue, Cleveland 3, Ohio. Cable Address: Preformed-Cleveland.

PLP 10 YEARS OF Power Line Progress

You can look up to

Preformed

Made in accordance with or for use under U. S. Patent No. 2,761,273; other patents issued and pending.

Manufacturers—Distributors

Industrial Product Clinic

Empire Supply Co. of Visalia conducted an unusually successful industrial product clinic, the first ever held in the Central Valley of California, Saturday, Feb. 1. The clinic included exhibits and demonstrations of products carried by this industrial and electrical distributor.

There were also two conference sessions at which practical information was given to the almost 200 plant manager, school and public building maintenance engineers, buyers and government officials attending. (See next issue for detailed story with pictures.)

► **C. D. Belt & Co.** of Denver has been appointed manufacturers' representative for Wakefield and one of its first jobs was a luminous ceiling for the newly remodeled National City Bank. Belt also represents Gotham Lighting Corp., Smoot Holman and Wide-Lite Corp. New offices have been opened at 1158 S. Colorado Blvd.

► Phil Pryne will be Western regional manager for **Emerson-Pryne** in a new sales organization combining the staff of Emerson Electric and Pryne. The Pryne sales force had continued to operate at Pomona, Calif., after purchase of the firm by Emerson last March but the new setup puts headquarters at St. Louis.

► A new, entirely magnetic plug-in breaker without thermal element and hence unaffected by temperatures is soon to be put on the market by **Murray Mfg. Corp.**, according to Ernie Hauck who, with his assistant, Ralph Mooney, attended a special showing in New York.

► **Maydwell & Hartzell** recently held a three-day sales meeting at its San Francisco general office, with representatives attending from the Seattle, Spokane, Portland, San Francisco, Los Angeles and Phoenix sales districts. Presiding was Dean P. Cady, vice-president and general sales manager, assisted by executives from the principal factories represented.

► **Rutkin Electric Sales** expects to make a considerable saving in material handling costs when it moves to its new location at Los Angeles in mid-May. Rutkin plans to store conduit in lifts of approximately 2,500-lb as they are received from the factory instead of breaking up the bales for storage. The new quarters at 740 Kohler Ave. will give 11,000-sq-ft of space, about triple the current floor space.

► **Spang-Howarduct** Division of National Supply has appointed two new agents in the West. Arthur E. Bacon, 1240 S. Elizabeth St., Denver, will cover the State of Colorado (except Grand Junction) and the eastern part of Wyoming. David M. Merrill, 192 N. First, E., Farmington, Utah, will serve the State of Utah, southeastern Idaho and Grand Junction.

► Predictions of downward business trends have not slowed expansion plans of **Blakeman Bros. Electric Mfg. Co.**, Los Angeles manufacturer of meter mounting devices. Last year this 20-year-old firm added more than 17,500-sq-ft of building area, new offices and an advertising department; improved its engineering facilities and put in a new painting process to guarantee a baked weather-resistant surface on its products. At the beginning of this year it remodeled its stockroom to double capacity and in coming months will set up new warehouses in San Francisco, Seattle, Phoenix and Honolulu. A catalog of new products and redesigned meter mounting devices will come out in midyear.

► **Shaffer & Nelson** is now handling Burndy products in Utah as well as in its former territory, Washington, Oregon and southern Idaho. Paul R. Hansen of Salt Lake City has been assigned to the territory.

► **Fluorescent Fixtures of California** is adding to its main plant in South San Francisco, according to E. O. Anders, president. Manufacturing and storage facilities will be expanded from 110,000 to 130,000-sq-ft.

► **Circle F Mfg. Co.** has appointed the following sales representatives in the West: F. M. Nicholas Co., 714 Harrison St., San Francisco, distributor sales, and Jack Logan, 256 Magellan Ave., San Francisco, original equipment manufacturers, in northern California; Agencies Co., 836 Traction Ave., Los Angeles, distributor sales, southern California and Arizona; W. B. Buchman Co., 923 E. Third St., Los Angeles, OEM sales, southern California; L. S. Reed & Co., 1018 Lawrence St., Denver, OEM and distributor sales in Colorado.

► **Eagle Electric** has purchased the entire assets of the Matol Corp., Tilton, N. H., maker of metal socket shells and caps; the automatic screw machine department of Chase Brass & Copper Co., Waterbury, Conn., and the bottom turn knob socket division of Alcor Mfg. Co., Chicago.

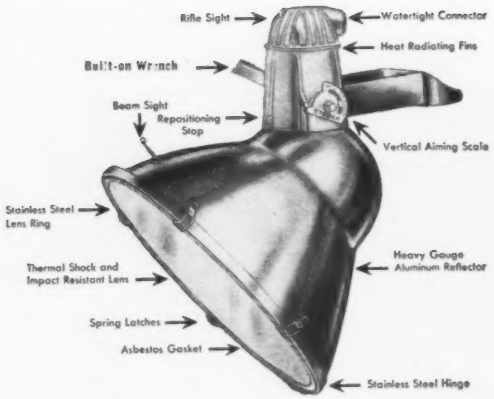
► **General Electric's Appliance Service** Center in Seattle, now located at 401 Westlake Ave., N., will move to the Albert Schafer Building, Third Avenue and Broad Street, where the firm has leased the entire ground floor. The new location is being remodeled to provide more than double the floor space at the firm's present location, and a large area for customer parking has been secured adjoining the building.

► W. E. Young has announced two major steps for 1958 expansion of his firm, **Young Electric & Mfg. Co.** at Denver. The firm, which was formerly a proprietorship, has been incorporated with Young, George W. Cook and Leona K. Young as directors. James T. Wall was appointed sales manager. Young also purchased a 50x125-ft site adjoining its present plant for the construction of additional manufacturing facilities. Young Electric manufactures switchgear, panelboards and other power and light equipment.

► **Graybar Electric Co.** has opened a new branch in Oceanside, bringing its total number of southern California branches to nine. The new branch will operate under the San Diego office and will handle construction equipment and housewares. Almost simultaneous with the opening of the new branch was the announcement that Graybar has been appointed exclusive southern California distributors for Lewyt vacuum cleaners.

► **John Maddox Sales Co.**, Los Angeles, has been named exclusive representative for Hexcel Products new Honeylite line in southern California, Arizona and Nevada. Honeylite is a light-diffusing aluminum honeycomb for luminous ceilings and fixture unit lighting.

► **Hopkins Engineering** in San Fernando, Calif., has announced completion of a $50,000 expansion, which added 3,700 sq ft to its existing building. The firm produces electrical capacitors.



***NEW* "Series 4000" Sports and Industrial Floodlights Have *All* the Features You Want!**

New Steber floodlights meet *any* and *all* job requirements! They are easy to mount on crossarms, poles or walls. They are easily and accurately aimed.

Maintenance is simplified by the exclusive Steber *ANODAL* finishing process which gives a smooth, hard, glass-like finish to both the inside and outside surfaces of the aluminum reflector. Steber "Series 4000" floodlights meet NEMA Specification FL 6-210 for general purpose enclosed floodlights 300 to 1500 watts. Also uses 400 watt mercury vapor lamps.

You can pay more, but you can't buy a better floodlight!

Write for Steber "Series 4000" literature now!

Lighting Units **STEBER** *for Every Need*

STEBER MANUFACTURING CO. • Dept. 57, Broadview, Illinois

STEBER MFG. CO. OF CALIFORNIA, Inc.
242 So. Anderson St., Los Angeles, Calif.

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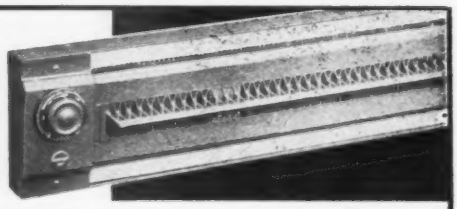
Futura

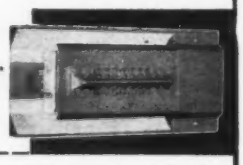


DRAMATIC NEW THIN DESIGN... THE ULTIMATE IN BASEBOARD HEATING

Futura's revolutionary new slimmer, trimmer design offers you today's most modern heating system... the ultimate in heating comfort, convenience, economy and beauty. The slimmest, thinnest unit available anywhere in fin-tube heating.

TOMORROW IS BUILT RIGHT INTO... Futura...

Element completely sealed in ceramic core within aluminum fin tubing.



Wattages from 750 to 2750.

Lengths from 4 feet to 12 feet.

Individual room thermostat either built-in or wall-mounted.

Futura... BUILT AND BACKED BY THE MAKERS OF... ELECTRO-RAY

—CLIP AND MAIL—

Please send full Factory information on Futura Automatic Electric Baseboard Heat.

Name_____

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City_____ Zone____ State_____

Home Owner ☐ Distributor ☐

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ELECTRO PRODUCTS MFG. CO.

9310 N. E. Highway 99, Vancouver, Wash.

People

►**Samuel F. Bloom,** retired manager of the utilities department of Safeway Stores Inc. for the past 12 years, and formerly a member of the California Public Utilities Commission, has opened an office as consulting engineer at 25 California St., San Francisco. Bloom offers services in utility rate analysis, cost of service studies and negotiations of contracts for electric, gas, water and communications utilities. He is a registered engineer in California and member of the American Institute of Electrical Engineers. Bloom served with the California PUC from 1922 until 1945, and was with Safeway Stores from 1946 until his retirement in 1958. The telephone number of the new office is YUkon 2-9278.

Bloom

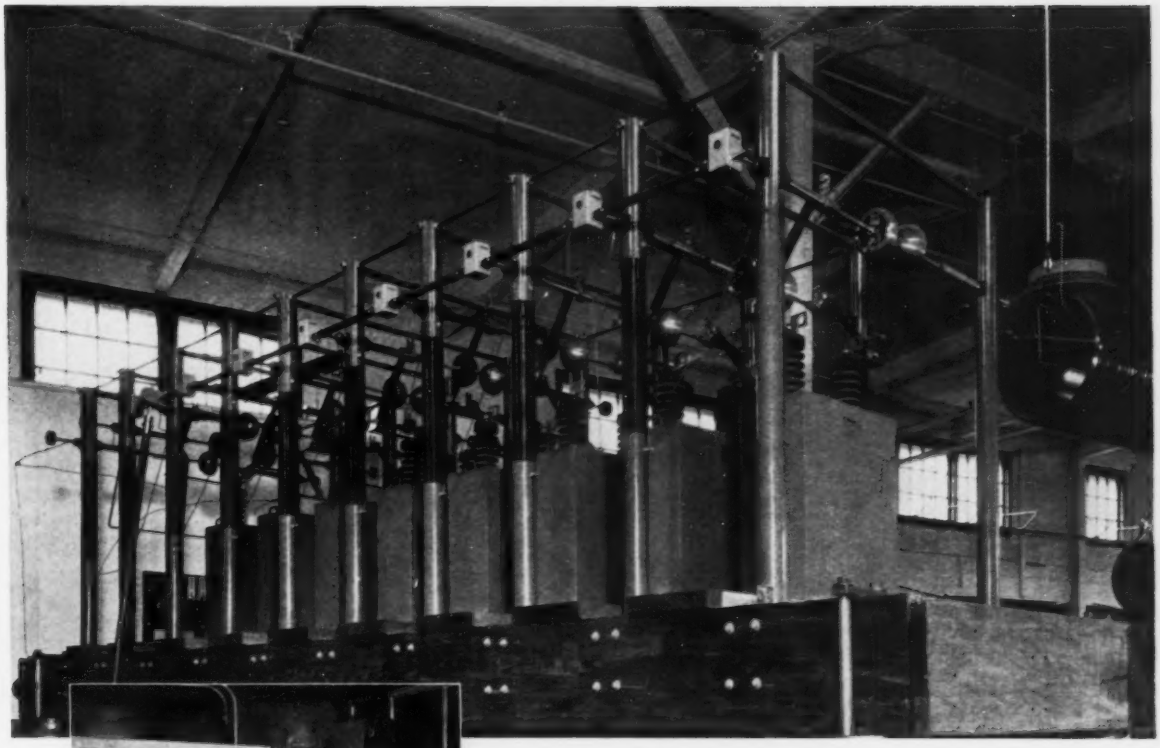
New Assignments

William J. Jenkins became manager of Alcoa's fabricating plant at Vancouver, Wash., Jan. 1. He was transferred from the Cressona, Pa., plant. He succeeded J. T. Barclay, who was advanced to the works manager at Alcoa's fabricating plant at Lafayette, Ind. Announcement was made by Donald H. Tilson, Alcoa's Northwest operating manager.

Changes in assignments in the sales office of Alcoa in the Northwest brought Eugene P. Burton to the Portland branch as manager in place of F. Scott Smith, who has headed the office since it opened in 1942. Smith moves to the Seattle office where he will carry on special assignments.

James K. Sliger with Alcoa for eight years was transferred from the Seattle sales office to Spokane as branch manager. He succeeds R. E. Burns who went to Chicago as assistant district manager of the Chicago sales office.

► **Arthur E. Bacon** has been appointed as agent and is responsible for promotion and sales of Spang-Howarduct underfloor duct and headerduct systems in Colorado and Wyoming. Bacon was formerly associated with Arthur E. Bacon agencies, and also served as district manager of National Electric Products in Denver.



The technician at the control panel of Victor's Impulse generator shown above, is photographing steep front wave forms for detailed laboratory study.

Steep Front Wave Tests at *VICTOR* Help Make Better Insulators

By David E. Alexander, Chief Engineer
Victor Insulators Division, I-T-E Circuit Breaker Co.

"The high voltage impulse generator in the Victor electrical laboratory enables us to simulate the most severe conditions of service an insulator will ever experience in use. By photographing the various wave forms caused by high voltage discharges, we are able to study in detail and at length, their many characteristics and their effects on insulator design and construction.

For some time now, we have been delving into the little known realm of steep front wave forms. This research has already resulted in better, stronger high voltage insulators . . . points the way to even better insulators as our studies continue."

This is but one phase of Victor's broad continuous program of research in electricity, ceramics and manufacturing methods . . . a program that bolsters our contention that "you can't buy better insulators at any price!"

I-T-E CIRCUIT BREAKER COMPANY
VICTOR INSULATORS DIVISION
Victor, New York

Sangamo J2 Meters

CLASS 100 AND CLASS 200

Give you all the revenue you've got coming

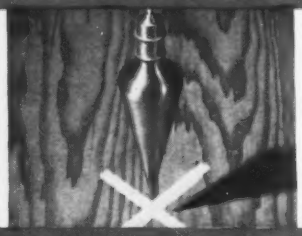
Sangamo watthour meters start on a 9 watt load and measure accurately to full 100 or 200 amperes. Will fully record the lightest loads of today and the heaviest loads of the future.

Give you all-weather accuracy

Corrosion-resistant finishes and materials are used throughout J2 Meters. You get optimum performance in humid, salt-laden or corrosive industrial atmospheres.

Give you protection against surge voltages

The extremely high insulation level of J2 Meters withstands high-voltage surges without damage. Highly surge-resistant Alnico damping magnets resist the de-magnetizing effects of lightning.



Give you sustained accuracy at all loads

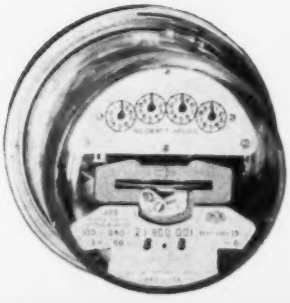
Sangamo J2 Meters have the highest starting torque in the industry. Their accuracy is not affected by friction caused by foreign matter—even down to the lightest loads.

Give you slowest disk speed

Only 10 revolutions per minute at full nameplate rating means longer meter life—and pleases meter-watching customers, too!

...AND ARE GUARANTEED FOR LIFE!

Now, an unprecedented lifetime guarantee—covering materials, workmanship and *bearing systems*—is offered on all Sangamo J2 Meters.



JM58-1

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

B. C. Promotions

Henry W. Smith has been appointed general manager of British Columbia Engineering Co., design and engineering firm for the British Columbia Electric Co. He succeeds William G. Huber, who retired to become special assistant to Thomas Ingledow, president of B. C. Engineering.

R. M. Bibbs has been named assistant general manager, and H. W. Peck executive assistant to Ingledow. C. H. Maartman has been named design superintendent of hydroelectric projects, and Harry M. Ellis is the new chief of technical research.

R. C. Hausch and F. J. Spook have been named staff engineers.

► **David M. Merrill** is now responsible for the promotion and sale of Spang conduit, Span-Gleam electrical metallic tubing and Spang underfloor and headerduct systems for the state of Utah, the city of Grand Junction and the southeastern section of Idaho.

Merrill

► **Merle W. Bell,** order service manager for the mechanical products department of the Westinghouse Sunnyvale Division, retired recently after more than 48 years of service with the company. In his years with Westinghouse he had worked at Salt Lake City, Denver and Los Angeles apparatus service departments. In 1927 he transferred to Emeryville, and then to Sunnyvale in 1947.

► **Dallas W. Cook** has been appointed treasury manager for the Pacific Coast region of Westinghouse Electric Corp. He will direct the company's treasury activities in nine Western states, Alaska and the Hawaiian Islands. Cook succeeds John J. Hayes, who retired.

Cook

► **Donald S. Gleason** has been appointed sales representative for the John C. Virden Co. in Washington and Oregon. Gleason has been in the lighting field 17 years.

► **Roger L. Conkling,** assistant to the administrator at Bonneville Power Administration, has left the organization to join H. Zinder & Associates, nationally known utility consulting firm, as Pacific Northwest utility and industrial accounts representative. While with Bonneville, Conkling was named a winner of the Arthur J. Fleming awards made annually to the nation's outstanding young men in government by the Junior Chamber of Commerce.

Conkling

► **G. L. Call,** Central Pacific district manager of Graybar Electric Co., was elected recently a member of the board of directors.

► **Aaron E. Newcomb** has been appointed the first superintendent of Dave Johnston steam power plant being constructed by Pacific Power & Light Co. near Glen Rock, Wyo.

► **Sherman Chickering** has been elected a vice-president of San Diego Gas & Electric Co., to succeed his late father, Allen L. Chickering. Sherman Chickering is a member of the San Francisco law firm of Chickering & Gregory, general counsel to the utility, and also a member of the board of directors.

Chickering

► **R. F. Schaefer** has been promoted from chief accountant to treasurer of the Snohomish County PUD at Everett. The position is a new one authorized under a new state law. Schaefer formerly served with Puget Sound Power & Light Co.

► **Theodore Cann** has been appointed auditor of the Montana Power Co. He succeeds J. J. Harrington, who becomes treasurer of the company.

► **Murray Winsley** has been appointed manager of the new purchasing and stores department of Hawaiian Electric Co. The new department combines operations formerly conducted in separate departments.

► F. W. Wakefield Co. representation in northern California area has changed. **C. T. Bakeman** has returned to Seattle to join a manufacturers' representative firm. **Robert Thallon,** San Mateo, was made resident sales engineer for the Bay area. A Stanford graduate, Thallon had formerly been with PG and E in Oakland and with All-Brite as its chief engineer.

► **Elmer Lago,** formerly associated with the T. L. Rosenberg Electric Co., Oakland, resigned recently to set up a business for himself.

► **William R. Sears** resigned as public relations manager for Sylvania Electric Products Inc., Pacific District. He has become affiliated with a trucking concern.

► **Roland R. Blantz** has been named to a new position of training and safety manager at Portland General Electric Co. His new duties will include assistance to various departments in presenting training activities and in formation of future training programs.

Blantz

► **E. A. Droegemueller** has been appointed branch house financial manager at Phoenix for Graybar Electric Co. He joined Graybar in Kansas City in 1953, transferred to Los Angeles in 1955, where he has remained until his present appointment.

► **Jackson T. Isbell,** vice-president in charge of sales of A. B. Chance Co. and former West Coast division manager, has been promoted to assistant to the president. In his new position, he will handle special assignments involving the company's expansion program and the development of new markets for Chance products.

Isbell

► **E. V. "Corky" Shafer** has been named employee publication editor of Portland General Electric Co. He succeeds Mary L. Bryan, who left the company after her recent marriage.

MINERALLAC

PRODUCTS NOW CARRIED IN SAN FRANCISCO STOCK

"PULL-IN" COMPOUND No. 100. For Use on Rubber, Synthetic, Plastic or Lead Covered Wires and Cables.

"VOLT-TELLING" STATISCOPES. Pocket Type for all-around testing. Station Type with Periscope.

STEEL HANGERS for Cable or Conduit.

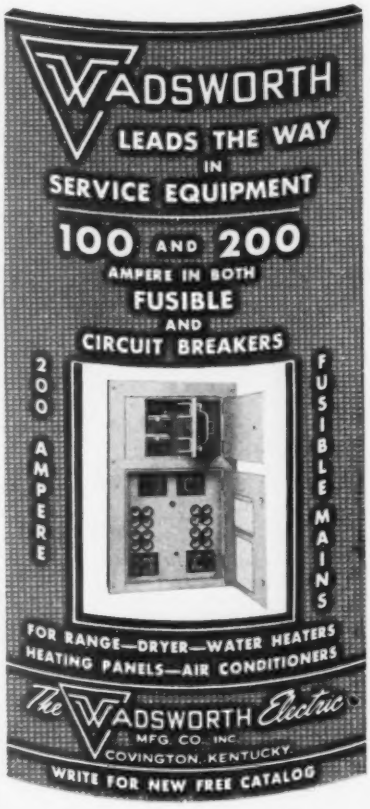
JIFFY CLIPS for hanging Pipe, Conduit or Cable.

BEAM CLAMPS Used with Minerallac Hangers.

MIN-A-CLIPS and STUD CLIPS—Designed for Installation Economy.

GEO. E. HONN CO.

Sutter 1-7352
420 Market St. San Francisco, Calif.



Electrical Engineer Wanted

for Provo City Municipal Power Utility (Pop. 37,000). Salary $515 to $575 per mo. Insurance, sick leave, retirement benefits and vacation. 40 hr. wk. Excellent working conditions. Apply City Manager, City Hall, Provo, Utah, giving qualifications, college, experience, age, etc.

(Advertisement)

Western Utility Budgets Up 14% for 1958

Selling to the electric power industry in the West should continue to be profitable in 1958. Budgets for new construction and maintenance by Western utilities reported in February ELECTRICAL WEST will be $1.12 billion this year, 14% higher than record-breaking 1957. For details, write ELECTRICAL WEST, 68 Post St., San Francisco 4.

Personnel Changes

Greatly expanded activities of Western Insulated Wire Co. have led to several personnel changes as the sales staff is enlarged.

Tom Deskin transfers to sales after 11 years in purchasing, Jack McGee changed from chief accountant to the sales staff, and Bernie Fischer moves to sales from the order desk. A new member of the sales staff is Jim Steiner.

Phil Ramos, who had been production control manager, is now purchasing agent for the company.

► **James D. Stephens** has been appointed sales agent for Federal Pacific Electric Co. in the State of Utah. Stephens has been associated with the electrical industry since 1946, with most of his activity in the Utah area. He is a graduate of Montana State College, and has done graduate work at Carnegie Tech and the University of Pittsburgh. He is presently studying business administration at the University of Utah. Stephens is a director of the Intermountain Electrical Assn. and a member of the executive committee of the AIEE.

Stephens

► **G. M. Richardson,** who is well known for his Pacific Coast Electrical Assn. work on standardization of utility construction items, has retired from service with Southern California Edison Co. He first joined Edison in 1911 as a meter reader and worked up to positions of responsibility in the purchasing department. It was while he was in this department that he conducted his valuable studies on standardization, and served one year as president of the National Association of Purchasing Agent.

► **James E. Beck** has been promoted to lighting sales director for Pacific Power & Light Co. Responsibilities will include consultation on lighting projects and personnel training in lighting services. He moves to Portland from Dayton, where he was district manager.

Beck

MOLONEY "SELECT-AMP"

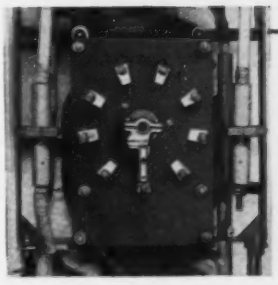
POLE TYPE STEP VOLTAGE REGULATORS

. . . provide an efficient, economical answer to your voltage regulation problems.

The component parts of Moloney "Select-Amp" Pole Type Regulators have the same carefully engineered, high quality construction found in all Moloney transformers. Here are some of the features of this regulator . . .

"Select-Amp"—The Moloney "Select-Amp" feature is controlled from the position indicator and allows the range of voltage regulation to be adjusted from a maximum of plus or minus 10% to a minimum of plus or minus 5%. Reducing the range of regulation to plus or minus 5% permits increasing load current to 160% of normal rating. The voltage is raised or lowered in ⅝% steps.

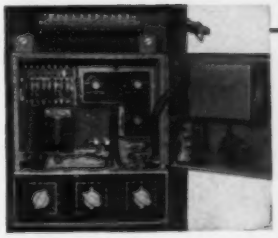
Position Indicator—is directly coupled to the drive mechanism. Resetable drag hands on the position indicator indicate the highest and lowest position the regulator has reached. These drag hands may be reset by operating the reset lever with a hook stick. The position indicator is mounted at an angle to facilitate observation of indicator from the ground.



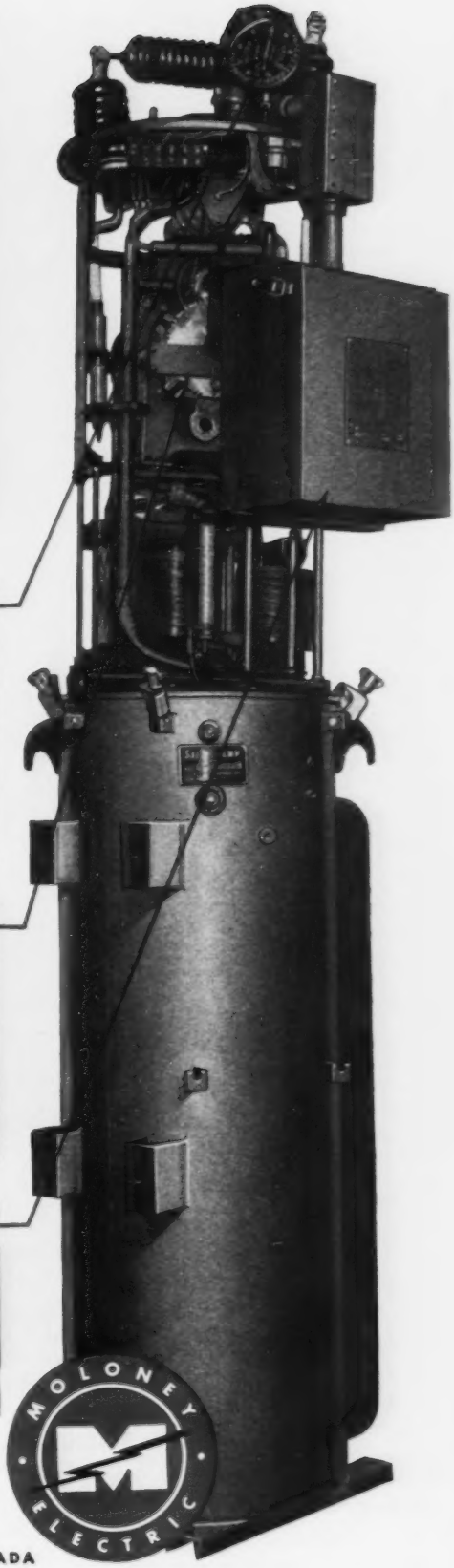
Moving Contact Assembly—consists of arc-resistant copper tungsten contacts contained in beryllium copper clamps, aligned with beryllium copper springs and compressed with coil springs to obtain correct contact pressure. A spring loaded accelerator provides "quick-break", "quick-make" action to all switching, thereby minimizing arcing time, consequently reducing contact wear.

Stationary Contact Blade—is made of copper chrome alloy and is tipped with copper tungsten to minimize arc erosion.

Mounting Panel—is made of heavy bakelite to provide an insulating panel for mounting the switch contacts.



Control Cabinet—The hinged front cover is gasketed and is secured by toggle clamps thereby affording both weather-proofing and accessibility. The toggle clamps are provided with padlock eyes so that the cabinet may be locked to prevent tampering. The cabinet is bolted to brackets on the tank wall and may be removed for mounting at the base of the pole.



MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

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Deaths

► **Allen L. Chickering,** former vice-president of San Diego Gas & Electric Co., died Jan. 6 in Oakland. He had been vice-president 36 years and a member of the board of directors for 34 years before retiring from that position in 1956. A member of the San Francisco law firm of Chickering & Gregory, general counsel to the San Diego utility, Chickering also was a director and executive committee member of the Pacific Gas and Electric Co.

► **F. Emerson Hoar,** 80, retired San Francisco consulting engineer noted for his water resources studies, died recently. In California he is remembered for studies of the economics of electric power system interconnection, the correlations between development of water resources for power and for irrigation, and investigations of power resources of the upper San Joaquin River. He was a retired lieutenant colonel in the U. S. Army Corps of Engineers.

► **William C. Rochat,** Portland electrical contractor, died recently in Tillamook, Ore., from injuries suffered in an automobile accident. He was a partner with his father, George L. Rochat, in Rochat Electrical Contracting Co.

► **Boyd L. Wolff,** 73, manager of the Lincoln (Ore.) County PUD from 1941 until his retirement in 1953, died recently in Portland. Prior to 1941, he operated the Wolff Electric Works in Portland for 22 years.

► **Clinton S. King,** 62, Sacramento electrical engineer, died Jan. 4. At the time of his death, he was chief electrical designer and consulting engineer for the firm of Porter, Urquhart, McCreary & O'Brien. During his career in the electrical industry, he served with the engineering staff of the Great Western Power Co., Pacific Gas and Electric Co. and the Sacramento Municipal Utility District.

► **William W. Corcoran,** sales supervisor for the Central Division of Puget Sound Power & Light Co., died recently after a brief illness.

► **Frank A. Banks, 74,** for many years a Reclamation Bureau official and widely-known as "the father of the Grand Coulee Dam," died recently in Los Angeles. At the time of his death, he was in Los Angeles for a meeting of the Klamath River Compact commission, which he headed. Banks had served as project engineer for construction of Grand Coulee Dam, and remained as supervisor of its operations until his retirement in 1950.

► **Roy Gruendler,** who supervised the electrical installation of Disneyland for Newbery Electric Corp. as its Santa Ana branch manager, died of a heart attack New Year's eve. Gruendler originally was an electrical contractor in the early days in Los Angeles.

► **Arthur Cutler,** Western Insulated Wire Co., succumbed to about a year of illness on Dec. 31, 1957, in Los Angeles.

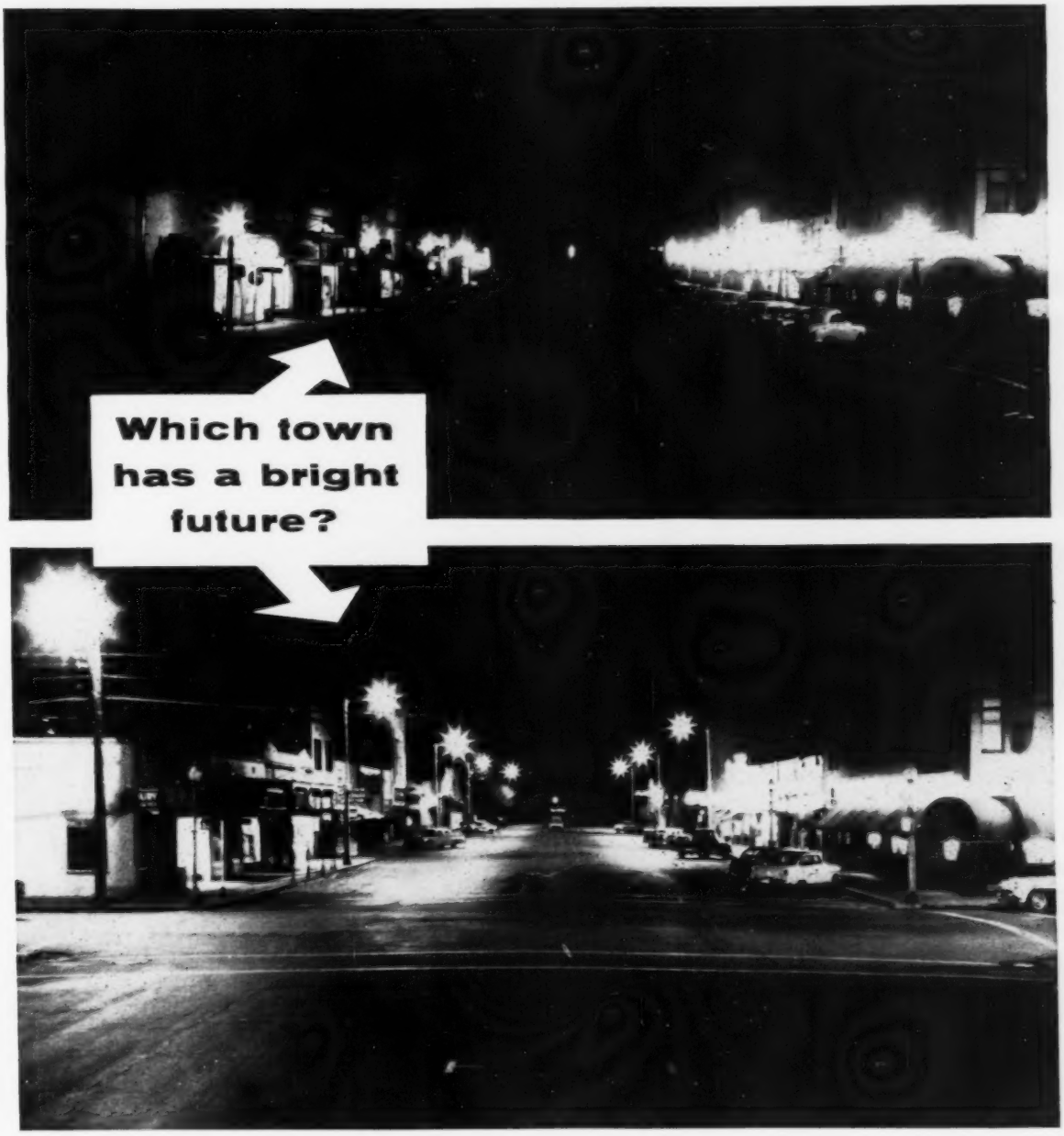
► **John Weiss,** coordinator of the electrical department for the Los Angeles Trade-Technical Junior College, died of heart attack late last year.

► **Clifton M. Mackey,** 63, General Cable Co. representative and former general manager of the Southwest district of Westinghouse Electric Corp., died in Honolulu of a heart attack in January. He went to Honolulu six months ago to open a Pacific area branch of General Cable.

► **Bernard O. Jackson,** who had been with Pacific Power & Light Co. for 25 years and was district manager at Thermopolis, Wyo., was killed in an automobile accident Jan. 17. He was originally with PP&L's predecessor in the area, Mountain States Power Co.

► **Dr. Adam S. Bennion,** formerly vice-president and personnel director of Utah Power & Light Co., 71, died Dec. 11 in Salt Lake City. He had retired from the company after 25 years to become a member of the Council of Twelve Apostles of the Church of Jesus Christ of Latter-day Saints in 1953. Dr. Bennion advanced from UP&L personnel director in 1928 to assistant to the president in 1934 and vice-president in 1945. An eloquent speaker, he was in demand to address many electrical conventions in the Western states. Prior to joining UP&L he had been a teacher and a professor at University of Utah and Brigham Young University.

► **Earl R. Northmore,** retired, formerly vice-president of the Los Angeles Gas & Electric Corp., charter member of the Los Angeles Electric Club and prominent in electrical circles throughout his life, died Jan. 14 in Los Angeles.



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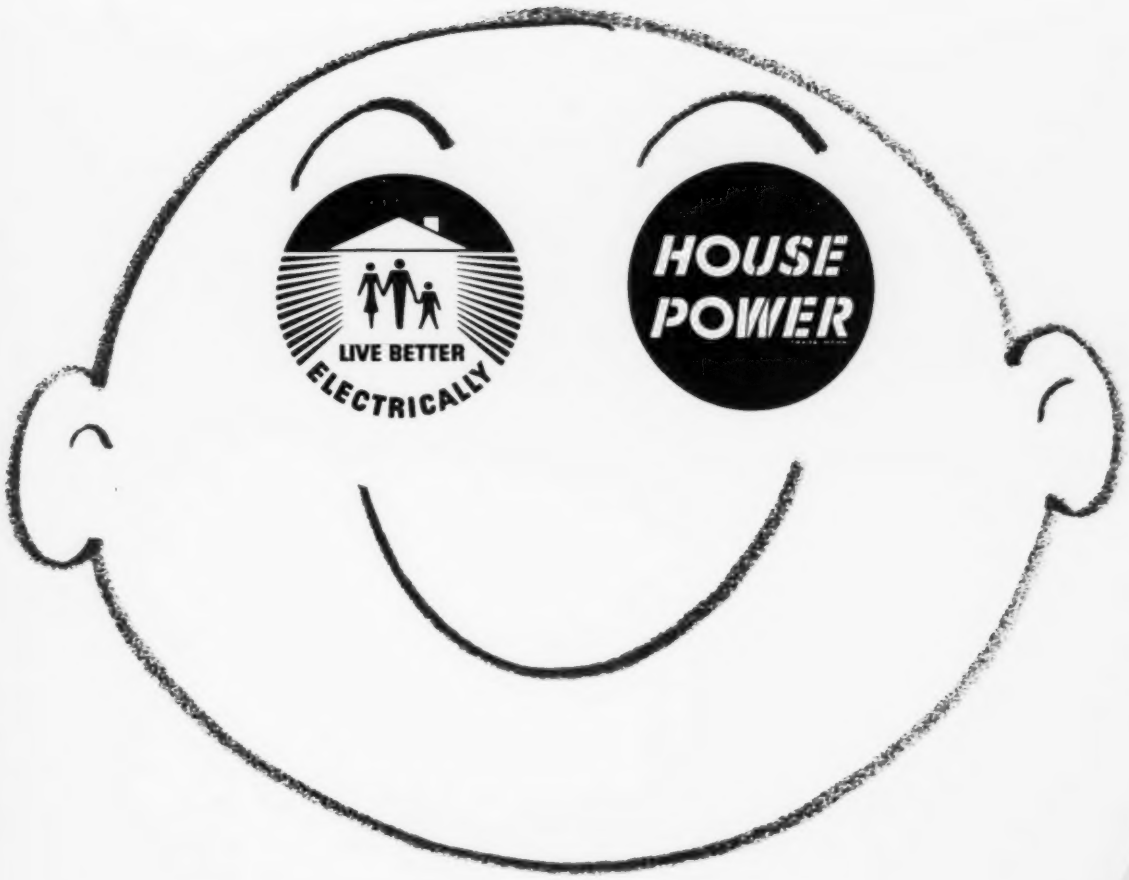

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